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BUMPER 164 PAGE ISSUE

ACORN USER

OCTOBER 1991 £1.60



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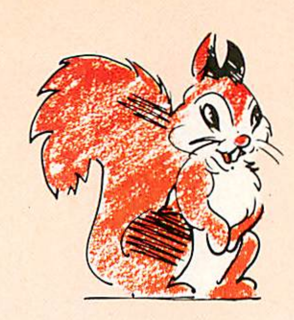
FULL PREVIEW OF OUR SHOW INSIDE

ORGANISING THE CLASSROOM

MAKING THE BEST USE OF MICROS IN SCHOOL

NEW ACORN MACHINE/OPERATING SYSTEM? SEE PAGE 7

SQUIRREL

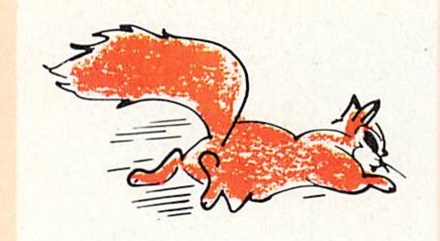


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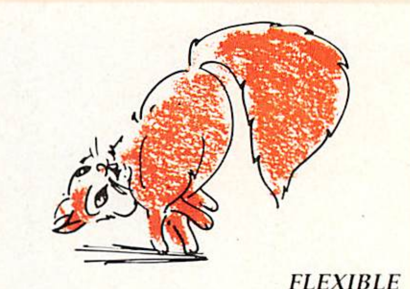
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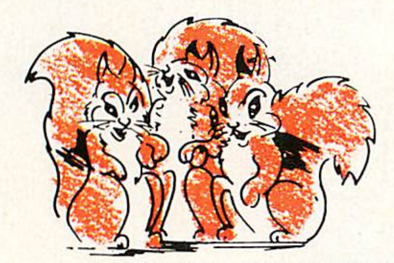
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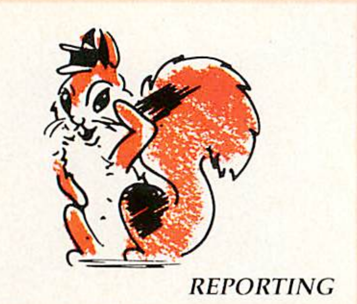
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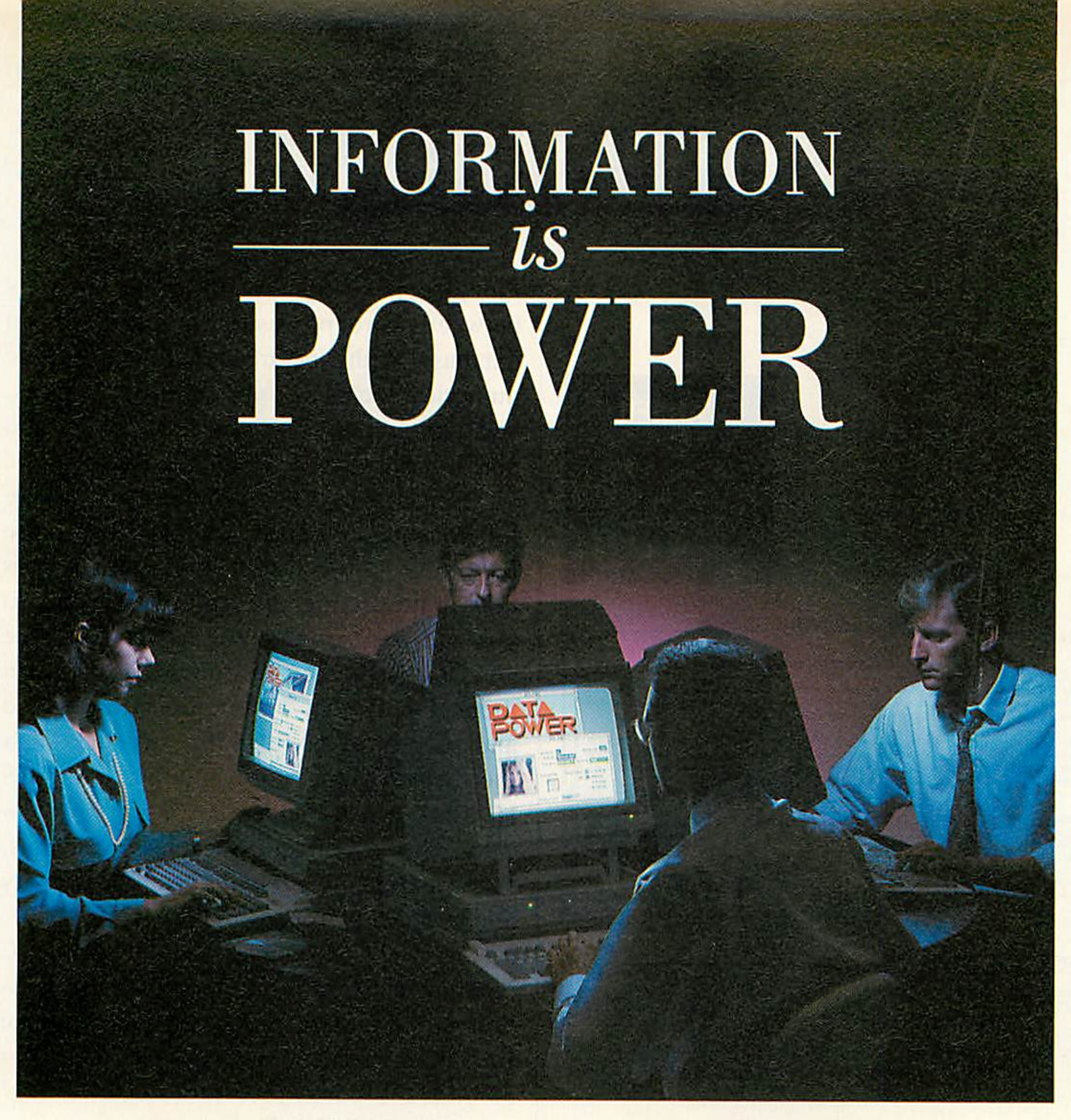
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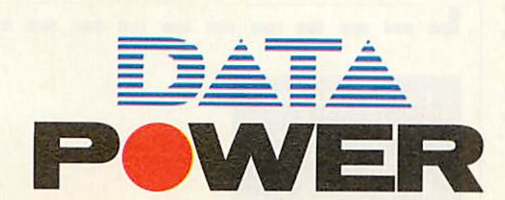
SEE A PREVIEW AT THE ACORN USER SHOW

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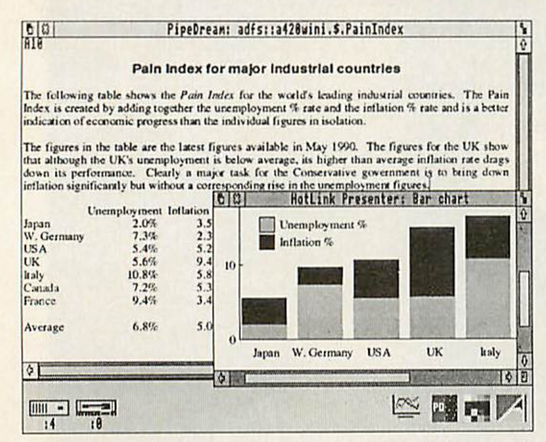


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PIPEDREAM 3

WINNER
of the 1989/90 BBC Acorn User Award for Best 32-bit Business Software



The bar chart in the screen shown above was produced by using the HotLink between PipeDream 3 and HotLink Presenter.

Major features include:

- intuitive RISC OS user interface
- many documents loaded at once
- display and printing of pictures within text
- wysiwyg display including all RISC OS fonts
- built-in 93,003 word spelling checker
- file compatibility with PC & Z88 PipeDream & BBC View Professional
- natural, background recalculation
- keystroke compatibility with Z88 & PC PipeDream
- Z88 filing system
- automatic loading of VIEW, ViewSheet, Lotus, First Word Plus, Tab and CSV files
- automatic saving of VIEW, Lotus, Tab, CSV and Acorn DTP format files
- multi-field sorting
- 62 spreadsheet and database functions
- external references between documents for 3-D modelling
- macro file recorder
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COLTON software

PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. With PipeDream 3, you can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

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As well as winning the 1989/90 BBC Acorn User Award for Best 32-bit Business Software, PipeDream 3 was runner-up in the Best 32-bit Educational Software and Best 32-bit DTP/Word Processor categories.

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OCTOBER 1991
ISSUE 111



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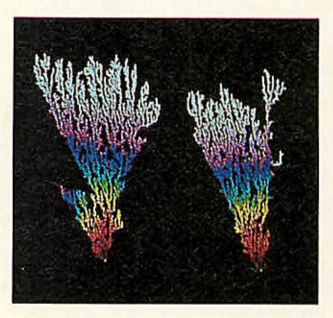
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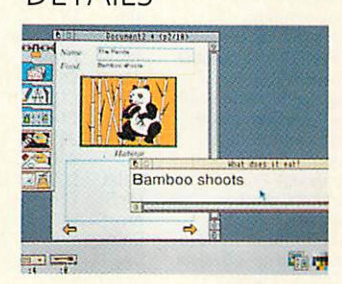
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COME TO OUR SHOW



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FREE DISC DETAILS



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GAMES PREVIEWED



Ian Copestake Software

September 1991

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ABBREVIATIONS

Ace	Ace	Datb	Database	Mora	Moray Micro
Aco	Acorn	DatS	Data Store	Morl	Morley
Alp	Alpine	Dom	Domark	Mus	Musbury
Apr	Apricote	Ecl	Eclipse	Oak	Oak
Arc	Arcana	Eiz	Eizo	Pan	Pandora
Arm	Armadillo	Emr	EMR	Pil	David Pilling
Arn	Arnor	Esm	ESM	Pre	PRES
Arx	Arxe	Ete	Eterna	Rai	Rainbow
Aut	Autodesk	Gem	Gem	Res	Resource
Bai	Baildon Electronics	Gra	Graphics Factory	Sel	Selctive
Bee	Beebug	Hum	Human-Computer	Ser	Serial Port
Cal	Calligraph	Hyb	Hybrid	Shi	Shibumi
Cam	Cambridge	Ico	Icon Technology	Sil	Silicon Vision
	International Software	ICS	Ian Copestake	Sim	Simtron
Can	Canon	Ife	IFEL	Spa	Spacetech
CC	ComputerConcepts	Iot	Iota	Sta	Star
Cha	Chalksoft	Irl	Irlam Instruments	Sup	Superior Software
Cir	Circle	Kad	Kador	Tec	TechSoft
Cit	Citizen	Kri	Krisalis	Top	Topologika
Cla	Clares	Lin	Lingenuity	Ubi	UBI Soft
Col	Colton	Lon	Longman Logotron	Vir	Virgin
ComT	Computer Tutorial	MicP	Micro Power	Wil	Wild Vision
Dabh	Dabhand	MicS	Micro Studio	4ma	4Mation
Dabs	Dabs Press	Mid	Midnight Graphics	4th	Fourth Dimension
		Mit	Mitre	Ð	Draw format
		Min	Minerva	Þ	Paint format

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FontFX	DatS	£9
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– Newhall / Starter / Symbol		each £35
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Font Pack	CC	
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– A3000 version	Wil	£390
Image (colour)	Irl	£589
i-Scan 200	Irl	£539
i-Scan 400	Irl	£589
Scan-Light A4	CC	£346
– as above + Sheet Feeder		£432
Scan-Light Junior	CC	£175
– A3000 version (internal)	CC	£175
Scan-Light Junior 256	CC	£210
– A3000 version (internal)	CC	£210

ODDULES

AnDi	Bai	£49
I²C SWI	Bai	£15
– bought with Oddule		£5
Oddule Adaptor (needed with your first Oddule unless you have an I²C socket)	Bai	£10



The number at the end of a product name is the formatted capacity in megabytes (rounded down). An L indicates a 1 inch high disc: two of these may be fitted in the same cradle or external case, sharing the same controller card. An S indicates a 2½ inch wide disc mounted directly on the controller card.

OUR PRICES FOR 'UPGRADES' INCLUDE THE ideA CONTROLLER CARD, A FAN WHERE NEEDED, AND EVERYTHING ELSE YOU WILL REQUIRE.

Our A310 internal upgrades need no backplane, so you may save over £60! If you do use one it must be a four-layer type.

ALL THE FOLLOWING GOODS ARE AVAILABLE NOW, AND ARE BACKED BY A YEAR'S EXPERIENCE IN SELLING IDE PRODUCTS.

COMPLETE UPGRADES

A300/400/500 internal upgrade

IDEARCIN20S ("hard card")	£475
IDEARCIN40	£269
IDEARCIN40L	£309
IDEARCIN80L	£389
IDEARCIN120L	£549
IDEARCIN200	£839

A300/400/500 external upgrade

(May also be fitted to A3000 external expansion slot using a podule case or racking system)

IDEARCEX40	£395
IDEARCEX40L	£449
IDEARCEX80L	£499
IDEARCEX120L	£699
IDEARCEX200	£935

A3000 fully internal upgrade

IDEA3IN20	£375
IDEA3IN40	£575
IDEA3IN60	£775
Fitting if required	£35

A3000 external upgrade

(*External* drive using *internal* expansion slot; can combine with PRES Disc Buffer Board)

IDEA3EX40 etc – prices as IDEARCEX40 etc + £10	
Fitting if required	£35

SEPARATES

Additional hard discs

IDEA40L	40Mb	£219
IDEA80L	80Mb	£309
IDEA120L	120Mb	£459

A3000 accessories

IC PLINTH **SPECIAL!** ☆**£18**
(The best monitor stand)

ideA controller cards and accessories

(For use with your own IDE hard discs; we can only accept responsibility for performance with discs we have tested ourselves)

IDEARCIN Arc Internal	£110
IDEARCEX Arc External	£140
IDEA3EX A3000 External	£140
Internal hard disc cradle kit	£15
Fan kit (Standard)	£10
Case + power supply & fan	£125
Fan kit (A3000 Internal)	£15
Cable for second hard disc	£5

Recommended for backing up

Beebug Hard Disc Companion £35

Recommended for an easier life with the Desktop

ICS Task & Window Organiser £19

KEYBOARD COVERS

Seal 'n Type (spill-proof)		
– Archimedes	Kad	£14
– A3000	Kad	£14



SAFE FAN CONTROLLER

- EASY TO FIT – NO SOLDERING
- MONITORS TEMPERATURE IN TWO PLACES
- VARIES SPEED FROM 10% TO 100% ACCORDINGLY
- TEST SEQUENCE ON POWER-UP TO GIVE YOU CONFIDENCE
- FOR A300 AND A400 SERIES

£15

COMING SOON from Ian Copestake Software



See our new-style, full-colour, user-friendly advertisements in next month's magazines !

E&OE SO38 91AU27

ovation

Professional Desktop Publisher

Ovation sets new standards of quality and value by offering professional features in an easy-to-use package at a very competitive price. We guarantee that you will be able to produce high quality documents within hours of opening the package. Ovation provides a formidable array of desktop publishing features, yet can be used just like a traditional word processor to produce single page letters or entire books with complete ease.

Price ***£99.00*** Exc. VAT

Features include:

- *multitasking/multi-documents*
- *full WYSIWYG display*
- *fast spelling checker (needs 2Mb)*
- *variable views • headers/footers*
- *font size 1-1000pt • master pages*
- *import draw & sprite files*
- *full colour support • linked frames*
- *multiple columns • stylesheets*
- *definable frame borders*
- *auto hyphenation (needs 2Mb)*
- *find & replace • line drawing*
- *cut, copy, paste via clipboard*
- *dot-matrix & laser printer drivers*

Please write or phone for a full specification.



The package includes a 250 page user guide for novices and experienced users, a quick reference card, 7 outline fonts, and a range of clipart.

C Development System for the Archimedes & A3000

The C development system is a **complete C language** at an incredible price. It is ideal for beginners, but may be used by experienced C programmers to develop large applications.

The package includes a **multi-tasking editor** from which programs may be compiled and executed without leaving the desktop. In fact you can compile, link and run C programs at the press of a key.

The **compiler** is quick, easy-to-use and generates ARM code which may be linked to other programs using the **linker**. Compiler errors are automatically highlighted in the editor for easy correction.

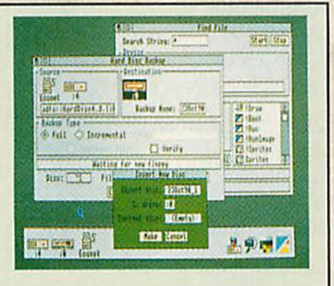


The package includes a 200 page user guide, editor, compiler, linker and library of functions. Requires 1MB RAM and single floppy drive only.

A comprehensive range of Acorn compatible **RISC OS functions** is included, allowing complete WIMP applications to be written. New libraries of functions may be created, or functions added to the existing libraries using the built-in **library manager**.

Price ***£77.39*** Exc. VAT

Hard Disc Companion



This is a reliable and easy-to-use hard disc archiver, which effortlessly backs up your hard disc (either all of it or just the latest changes) onto floppy discs. In the event of a hard disc failure you can confidently recover all your files. You can also restore individual files from the backup at any time - useful if you accidentally delete a file. Other features include:

- Full & incremental backups
- Automatic reminder
- Individual file restore
- Ignore files/directories
- File compression
- Full restore
- Verify whilst archiving
- 'Spark' file archiver

Price ***£33.91*** Exc. VAT

Star Colour Printer Driver



This RISC OS printer driver was developed in conjunction with Star Micronics for their excellent range of colour printers.. It gives superb results on both 9 and 24-pin printers, and is ideal for all applications that use RISC OS printer drivers. It is a Release 2 driver, supporting various print resolutions and 'fancy' text printing, and is suitable for the following range of printers:

- Star LC24-200 colour
- Star XB24-10 colour
- Epson JX compatible
- Star LC-200 colour
- Star LC-10 colour
- Epson LQ & SQ colour

Price ***£15.00*** Exc. VAT.

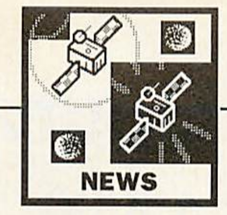
The official Star Micronics printer driver.

Quality software for the Archimedes and A3000



These products are available from all good dealers

RISC Developments Ltd. 117 Hatfield Road, St. Albans, Herts. AL1 4JS Tel: 0727 40303 Fax: 0727 860263



EXCLUSIVE

RISC OS 3 PLUS NEW MACHINE – AT OUR SHOW NEXT MONTH?

RUMOURS are rife that Acorn will be launching a new computer, featuring an updated operating system, at the forthcoming *BBC Acorn User* Show in October.

Informed sources have ascertained that the new machine will probably be a 'three-box solution' – which means a base unit, keyboard and monitor. Key features are thought to include an Arm3 processor (as in the A540, Acorn's top-of-the-range Risc machine) and an updated version of the current Risc OS 2 operating system – namely Risc OS 3.

There is no confirmation of what the new computer will be called, but it is unlikely to be tagged as an Archimedes. Acorn's recent deal on athletics sponsorship (see last month's issue) could mean a 'sporty' name tag. The Acorn Olympus, perhaps?

The new computer will not be, as has been rumoured, a 'BBC A3000 with an Arm3'. It would appear that it will be more like a PC, and will be aimed squarely at the home and professional user. Dos compatibility is thought to have been one of the key considerations in the development of the new operating system, Risc OS 3. The new machine is expected to read high-density 1.4 Mb Dos discs. It could prove a thorn in the side of Acorn's educational market rival, Research Machines, which is already suffering from competitive PC 'clones'.

It seems likely that the new machine will be offered in various forms, including a home office bundle – perhaps with the latest Acorn *PC Emulator* – and a desktop publishing package. CD-Rom capability via SCSI is also rumoured, so expect a complete CD-Rom solution to emerge as a future option.

At the time of going to press, details on retail price were not confirmed, but this is thought to be between £1200 and £1500. Although the machine may create its own niche between the A3000 and the 440/1 machines, the future positioning and pricing of the 400 series (a 440/1 with a colour monitor is currently around £1800) must surely be subject to change in the future, with the prospect of this latest alternative which offers both greater speed and a new operating system.

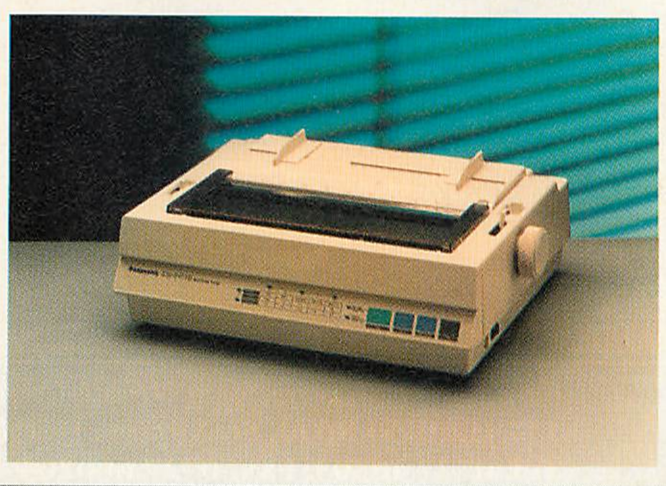
At the time of going to press, Acorn was unable to confirm or deny the rumours. Official details are expected to be revealed to the press as this issue of *BAU* hits the streets in mid-September, with the first public showing of the computer expected to be at the *BBC Acorn User* Show at London's Wembley Conference Centre, which will run from 11 to 13 October.

Further details of the new machine are likely to appear in next month's issue, advance copies of which will be on sale at the show.

LOW COST DOT MATRIX PRINTER

PANASONIC has launched a new low-cost dot matrix printer for the home, educational and business computing markets. The Panasonic KX-P1170 is a narrow carriage nine-pin model which retails at around £199.

A choice of four fonts is offered, in both draft and near letter quality modes. Three paper paths, a push/pull tractor and paper parking come as standard. Both single-sheet and continuous paper can be used. For details contact Panasonic on (0344) 853915.



FREE DISC WITH BAU

THIS MONTH *BBC Acorn User* has recorded yet another first in the Acorn market by offering a free cover-mounted 3.5in disc to its readers.

The magazine has joined together with ESM, the Cambridge-based educational software publishing house, to give readers a 3.5in demonstration disc of ESM's educational desktop publishing package, *Desktop Folio* (See full details of the disc, and how to use it on page 89).

Barry Monk, editor of *BBC Acorn User*, said: 'We are delighted to be the first Acorn magazine to give A3000 and Archimedes users a free cover-mounted disc without increasing our usual cover price. This is also the biggest issue so far this year, so readers can enjoy the best value for money in the Acorn marketplace.'

ESM's divisional director, Ysanne Heald said: 'We know that many *BBC Acorn User* readers are already valued customers of ESM, so we are delighted to give them, and other readers, an insight into *Desktop Folio*'s features and leave them hungry for more!'

ARM3 FOR BBC A3000

ATOMWIDE and Aleph One have teamed up to offer an Arm3 upgrade package for the BBC A3000. Previously only available for Archimedes A300/A400 series machines, the upgrade increases the speed of Risc OS applications, file operations and printing.

The package includes courier collection of your A3000, fitting of the Aleph One Arm3 upgrade, testing and return, usually within five working days. The cost is £399 ex VAT. The upgrade is also available with Atomwide's 4Mb RAM upgrade for £529 ex VAT. Contact Atomwide on (0689) 838852.

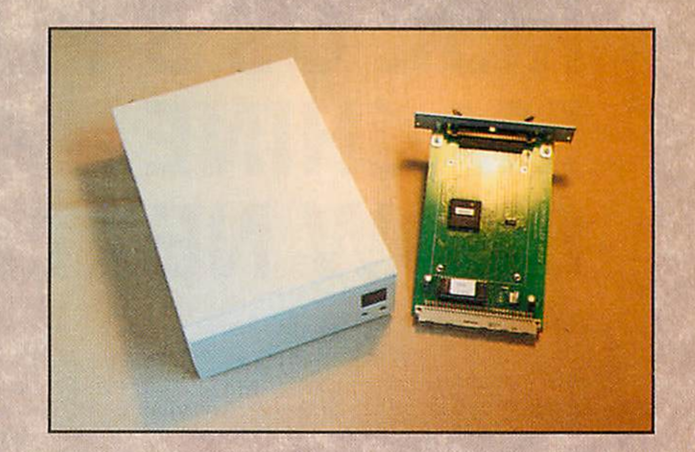
BBC ACORN USER SHOW – SEE PAGE 50 FOR FULL PREVIEW >>>>

IDE Hard Disc Upgrades
for the Archimedes & A3000

A revolution in hard disc expansion

What is IDE?

IDE (Integrated Drive Electronics) is the latest interface standard for connecting hard disc drives to personal computers. Unlike previous interfaces it incorporates much of the circuitry on to the drive itself, greatly simplifying the interface electronics.



How fast is IDE?

The IDE interface uses a full sixteen bit data bus that allows very high transfer rates between the drive and computer. This coupled with cache memory on the drive itself provides for an Archimedes hard disc system that is typically 50% faster than the standard Acorn ST506 hard disc interface.

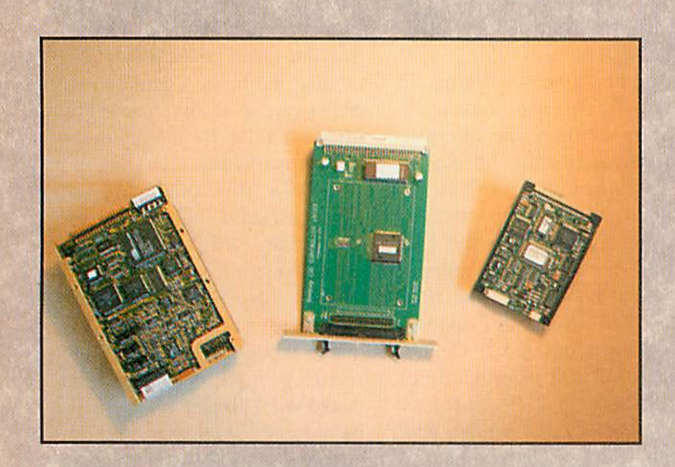
What drive options are available?

Archimedes 310, 440, 400/1 and 540.

Drive sizes currently available are 42, 89 and 105 Mbyte with a typical access time of 28ms for the 42Mb models and less than 20ms for the others.
These 3.5" drives are available as either internal or external units, and use our high speed 16 bit IDE interface card that fits in your podule backplane. External drives are attractively boxed with their own internal power supply and fan. You may even use both an internal and external drive from the same interface if required.

A3000

The external drives above are also suitable for the A3000, used in conjunction with the 16 bit interface card that fits in the A3000 podule slot. We are also able to offer internal IDE drives for the A3000 that fit into the internal podule slot. These special 2.5" dirves are available in 20 and 42 Mbyte formats and have access times of 23ms.



Will my existing software work with IDE?

The careful design of RISC OS and IDEFS, our IDE filing system, ensures that all RISC OS compliant software will function perfectly with IDE drives. Some older software may need minor changes, but these are documented in the user guide. There are no hidden catches!

Can I add additional drives at a later date?

The IDE interface can support two hard disc drives. Typically, one of these would be fitted internally, and the second unit connected externally via the expansion connector provided on each interface card.

What does the future hold?

IDE is a relatively new interface standard, but has already gained massive support. The next few months will see drives up to 400Mbyte, with larger capacities, and devices such as tape-streamers following very soon. The future for IDE is very bright indeed.

Quality

You may have total confidence in our products. Only the best drives from recognised manufacturers are used, Conner, Seagate, NEC etc. All drive kits are supplied with full fitting instructions and a user guide to ensure that you will have no problems at all. Our interface conforms fully with Acorn's IDEFS specification.

	Internal		External	
Description	**Stock Code**	**Price**	**Stock Code**	**Price**
Archimedes 42 Mb	*5251*	*£269.00*	*5261*	*£359.00*
Archimedes 89 Mb	*5252*	*£389.00*	*5262*	*£479.00*
Archimedes 105 Mb	*5253*	*£499.00*	*5263*	*£589.00*
A3000 20 Mb	*5270*	*£375.00*	*N/A*	------
A3000 42 Mb	*5271*	*£569.00*	*5281*	*£369.00*
A3000 89 Mb	*N/A*	------	*5282*	*£489.00*
A3000 105 Mb	*N/A*	------	*5283*	*£599.00*

All prices include IDE High Speed Interface.

All prices are Ex VAT

Available from your local dealer, or directly from Beebug (please add £9 carriage).



Please write or phone for our New A4, 72 page full colour Product Guide.

117 Hatfield Road, St. Albans, Hertfordshire AL1 4JS
Tel. 0727 40303, Fax. 0727 860263

This advertisement was produced entirely with Ovation DTP from BEEBUG



PC COMPATIBILITY PODULE FOR THE ARC NOW READY

FOLLOWING hot on the heels of the launch of Acorn's new *PC Emulator* software comes the announcement of a hardware alternative by a third party developer.

Aleph One, the company best known for its Arm3 board development, has announced a new podule which will endow the Archimedes with comprehensive PC-compatibility. A prototype will be shown at the *BBC Acorn User* Show and the finished product should be on sale by the end of the year.

The new multi-tasking version of Acorn's PC *Emulator* is a programming wonder, but there's no disguising that it is still too slow for intensive PC use. A hardware-based solution has long been regarded as the best alternative for users looking for a 'real' PC inside their machines.

After Acorn abandoned its PC podule soon after the Archimedes was launched in 1987, hopes that a hardware PC add-on would ever appear for the Archimedes faded, even though similar devices have sold well on such popular platforms as the Commodore Amiga, the Apple Macintosh and the Atari ST.

Acorn abandoned its somewhat non-standard 80186 PC podule project because it thought the asking price would be too close to that of a PC system on its own. Risc OS and chip prices have put that argument out of date.

Two of Aleph One's design staff are currently working full-time on the project. The card will initially feature the popular 20MHz Intel 80386SX processor, although the design will accommodate recently introduced higher speed variants from Intel's rival, Advanced Micro Devices. A maths co-processor chip socket is also included.

From a user's point of view, the card will work in much the same way as the new Acorn *PC Emulator* in that it will multitask within Risc OS, although it will be much faster. Unlike the emulator, Aleph One's solution will provide full VGA display capability.

With PC chip prices dropping rapidly because of renewed competition and a slow-down in the PC market, it will be interesting to see what price Aleph One settles on for the new PC podule.

With the news of a possible Acorn 'Risc OS PC' (see page 7), the quest for true PC-compatibility is becoming a reality.

● Meanwhile, Aleph One has announced an immediate 12.5 percent reduction in the cost of its 25MHz Arm3 upgrade board for the Archimedes, from £445 to £389.

Explaining the reduction, Aleph One's Alex van Someren said: 'For the first time, we have enough Arm3 chips to supply upgrades from stock. During the past 18 months we've had to run waiting lists, but we can now fulfill orders the same day.

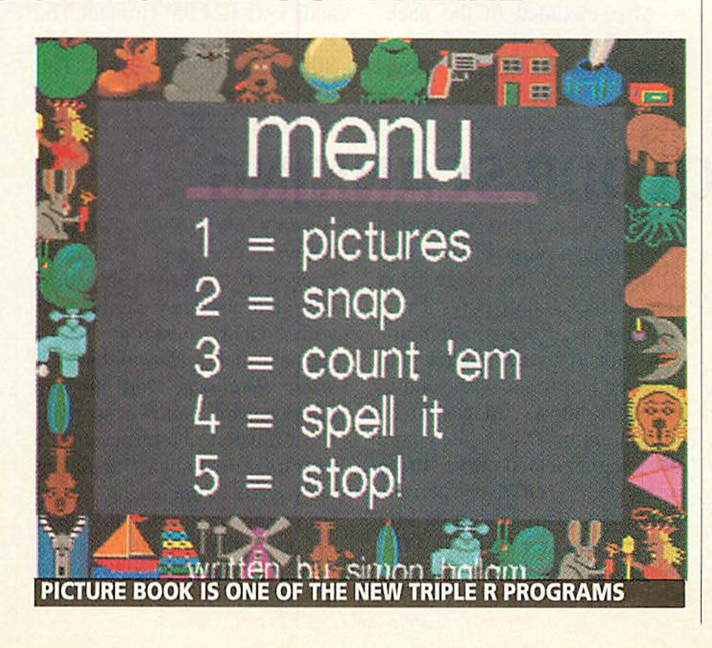
'Our price continues to reflect the superior quality of our upgrade. We have repeatedly redesigned and reduced the size and cost of the upgrade as chip availability has allowed – now we are pleased to say that we are able to pass on these substantial savings to our customers.'

GAMES-QUALITY GRAPHICS PROMISED FOR NEW EDUCATIONAL SOFTWARE

A NEW COMPANY in the Acorn market pledges to 'bring to educational software the quality of sound and graphics that modern games display'. Triple R Education is a joint venture between Pete Davidson, former teacher, and Steve Botterill of The Fourth Dimension.

The range includes: *Picture Book*, four colourful programs designed to welcome children to the micro; *Money Matters*, which teaches users about currency; *DataWord*, a combined database, wordprocessor, quiz game and programmed learning book; and *Target Maths*, a suite of four maths programs.

Contact Triple R Education on (0742) 700661.



PICTURE BOOK IS ONE OF THE NEW TRIPLE R PROGRAMS

EINSTEIN THEORY

ACE COMPUTING, best known for its highly successful *Euclid* three dimensional drawing and animation package, has come up with what promises to be a stunning new 3D package called *Einstein*.

Ace has extended the features of *Draw* by adding multi-dimensional capabilities to it. In fact, the company describes its new graphics package as a multi-dimensional editor which presents the user with a highly 'consistent' world for graphic design.

At the heart of *Einstein* is the ability to manipulate Bezier curves – indeed, Einstein moves up from *Draw*'s two dimensions to create three and four-dimensional Bezier surfaces (time is the fourth dimension). This is a concept Ace calls a 'n-dimensional Bezier hypervolume'. Working in higher dimensions is achieved by extruding lower dimensional objects.

Ace Computing's Tony Cheal points out that *Einstein* offers most of the features which are currently offered individually by the company's *Euclid 2*, *Tween* and *Mogul* packages. Users of these packages will be able to upgrade to *Einstein* for a specially discounted price.

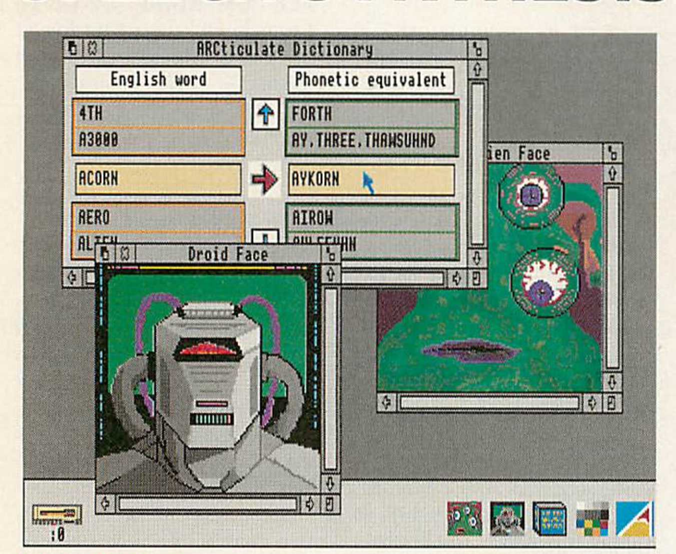
Einstein for the Archimedes costs £120, including a set of 3D fonts. Contact Ace Computing on (0223) 322559.

CHANGE OF NAME

LAST MONTH we brought news of two new sound samplers from Hybrid Technology and Oak Solutions. Unfortunately, both called their products ArcRecorder. The good news is that Oak Solutions has since renamed its sampler Oak Recorder. But the firm still doesn't accept that Hybrid Technology has the right to the ArcRecorder name. At least for now the confusion seems to have been sorted out.



4D PUTS A HUMAN FACE TO SPEECH SYNTHESIS ON ARC

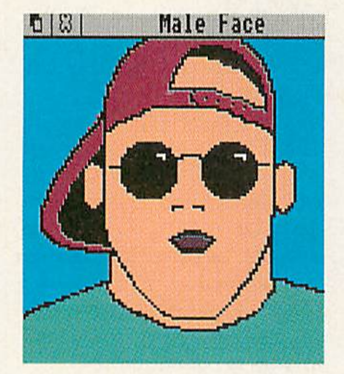


THE FOURTH Dimension has moved one step closer towards bringing your A3000/Archimedes to life with a new animated speech synthesiser.

Called *ARCticulate*, the new synthesiser has faces that talk to you and to each other. You can choose from four main faces and voices – male, female, alien or droid.

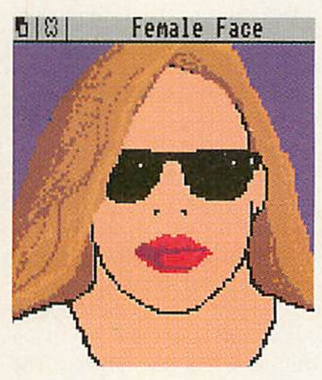
ARCticulate works in the desktop environment allowing full multitasking with word processors and other programs. The program will read documents that you have written, or jokes and questions.

The pitch, speed and volume of each voice can be altered during and after any sentence. The dictionary supplied is a Risc OS application



and holds up to 600 words in any file. You can have as many files as you wish, making the program ideal for specialist subjects.

Also included in the package are a selection of jokes, some amusing noises, a provisional dictionary file and a



demonstration program showing you just how articulate *ARCticulate* is!

Key features are:

- Four animated faces which can cover all mouth positions
- Four sampled voices which can say what you want
- All faces and voices can be installed together
- An individual face and voice can be installed in less than 120K
- An easy-to-use dictionary application which can include 600 words per file and limitless files
- Text files and word processor documents can be easily used with your own programs
- Joke, demo and funny noises programs are also included

ARCticulate runs on the BBC A3000 and Archimedes and costs £24.95. Contact The Fourth Dimension, 1 Percy Street, Sheffield S3 8AU. Tel: (0742) 700661.

CHEAPER COLOUR SCANNING

IOTA Software, the recently formed educational software house, has launched a new 'Image' range which includes new overhead-style colour and mono scanners.

The Iota Colour Image Scan is expected to cost one-third less than the nearest alternative. The black and white version can be upgraded to colour with a special kit – a feature not currently available on other scanners available for the Archimedes.

The scanners are supported by an Image range of software. *Display* takes the image from the scanner and displays it in a window as it scans. *Animator* can turn scanned images into animated cartoons with sound. *Outliner* allows images to be turned into *Draw* files and uses sophisticated curve fitting methods. *OCR* permits scanned text to be turned into ASCII text for use in DTP documents. *Fontmaker*, written by the same person who wrote Acorn's own *Font Manager*, allows outlined scanned images to be turned into new outline fonts. They can be used with most desktop applications, such as *Draw*, *Impression*, *Pendown*, and so on. *Musicmaker* allows scanned sheet music to be turned into a *Maestro* file that can be played on your machine using *Maestro* or another music package.

For further details, contact Iota Software on (0223) 421542.

NEWS IN BRIEF

● **ACORN** has increased its support for its user base of customers by making arrangements to monitor conversations on electronic bulletin boards and offer advice where approrpriate.

The system relies on Fidonet, an amateur worldwide communications network of bulletin boards. Any board which subscribes to Fidonet – thought to number 10,000, with over 300 in the UK – can take the Archimedes Echomail conference. Users with modems can log onto their favourite bulletin board and participate in message conferences with other users taking the Archimedes Echo. Contact Acorn on (0223) 245200.

● **SOFTSHOP** Computers of Bishop Stortford has introduced a new range of correspondence courses to teach programming. Designed by professional lecturers, the courses cover the Archimedes and BBC A3000, as well as the BBC micro. No previous experience is necessary and prospective students without computers can purchase them at special prices. Contact Softshop Computers on (0279) 718596.

● **BBC** A3000 computers are at the heart of 12 new interactive systems developed for the RAF's recruitment trailers which travel around the UK. The systems, designed by Simis Ltd of Guildford, enable interested youngsters to get a feel for the complexities of flying RAF Tornado IDS aircraft. Simis is the company behind the design of Interdictor, the popular flight simulation program.

● **MORLEY** Electronics will be holding a special needs open day at its premises in North Shields on September 17. Hardware and software for Acorn users with special learning needs will be available. A number of specialist software houses will be exhibiting and Acorn will be showing its Special Access Pack. Contact Morley Electronics on 091-257 6355.

● **FUJITSU** has introduced the FaxJet, which lets you print incoming faxes on your laser printer. At £795, the company says it is an affordable alternative to plain paper laser fax machines. FaxJet works with Fujitsu and Hewlett-Packard LaserJet II and III compatible laser printers and DeskJet compatible ink-jet printers. Contact Fujitsu on 081-573 4444.

IMPROVE YOUR IMAGE FOR ONLY £399

Excl. VAT

The new IOTA *"Image"* range is designed to close the gap between working with pencil and paper and using your computer. At the head of the range is the new 'overhead' style *'Image Scanner'* that will scan anything from your line drawing to the page of a book to a 3D object, and is available in both black and white and in colour.

IMAGE DISPLAY

'Image Display' is the software that takes your image from the scanner and displays it in a window, allowing you easy control of the contrast, resolution and scan area.

IMAGE ANIMATOR

'Image Animator' can bring your images to life, the overhead, flat base nature of the *'Image Scanner'* makes creating your own animation quick and easy. Animator will run in windows or on a full screen.

IMAGE OUTLINER

'Image Outliner' – using sophisticated curve fitting techniques Outliner will turn your image into a draw file that gives it infimate resolution in effect. Ideal to manipulate or drop into your DTP documents.

IMAGE OCR

'Image OCR' – using image display you can select which areas of your image you want as 'Sprites', which you want 'Outlined' and which areas are text. Using Optical Character Recognition, *'Image OCR'* will turn your areas of scanned text into ASCII text for you to use in your wordprocessing or DTP documents, just as if you had typed it in.

IMAGE FONT MAKER

'Image Font Maker' – Scan the characters and *'Font Maker'* will allow you to tweek them until you are happy and then save them as a new 'Outline' font.

IMAGE MUSIC MAKER

'Image Music Maker' – Scan a page of music and *'Music Maker'* will make it into a maestro file that you can play or edit to your hearts content.

THE IMAGE RANGE

LAUNCHED AND AVAILABLE AT THE ACORN USER SHOW

The *'Iota Image Range'* is available from Iota Software on

(0223) 421542

(school orders welcome)



IOTA Software Ltd, The St John's Innovation Centre, Cowley Road, CAMBRIDGE, CB4 4WS.
Telephone: (0223) 421542 Fax: (0223) 421543

It's not often you'll hear that said in Educational Circles!

But in the case of Lingenuity's SCSI Share hard drives it's true!

Designed as an applications server to work with or without an existing network, SCSI Share transfers data at 750Kb per sec. (the average floppy disc operates at 25Kb per sec.!)

SCSI Share suits IT environments where computers live close together (*small clusters in the class room or computer resource rooms*), and for a typical cluster of 6 computers the cost per computer is just £225 for everything, including installation and training.

In a nutshell, SCSI Share offers individual hard drive performance whilst being easier to manage than a network, floppy discs, or individual hard drives — all at an affordable price.

More Technology for less Money!

SHARING MAKES SENSE

098 685 477

SCSI SHARE

FOR 32 BIT ACORN COMPUTER CLUSTERS

Acorn Acorn Acorn

LINGENUITY PROFESSIONAL

WOOD FARM LINSTEAD MAGNA HALESWORTH SUFFOLK IP19 ODU
TEL: 098 685 477 FAX: 098 685 460

A DIVISION OF LINDIS INTERNATIONAL LTD

adfs::HardDisc4.$.FontFXFile

THE DATA STORE

Acorn User Show

See us on Stand 113

dfs::HardDisc4.$.DrawFile

Look out at the Acorn User Show for NEW SOFTWARE RELEASES and our special CLEARANCE BARGAINS

Message from Data Store

We are closing for shopfitting from 9th to 16th October!

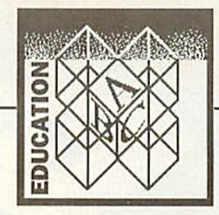
Please phone to check exactly when we are re-opening.

We look forward to seeing you then.

OK

RAM:$.Address

6 CHATTERTON ROAD, BROMLEY, KENT BR2 9QN
Telephone 081-460 8991 Fax 081-313 0400



NCET SEAL OF APPROVAL

AS A RESULT of the DES scheme to assess the significance of CD-Rom technology within schools, NCET has compiled a list of tested and approved CD-Rom products.

The report details hardware requirements for installing the drives, and the advantages and limitations of individual discs such as speed of installation, ease of use, and ability to display graphics, when used on specific machines.

This information will be of especial interest to Archimedes owners. The majority of CD-Rom discs are published for Apple Macs or IBM PCs/compatibles running MS-Dos. Although the Archimedes can emulate IBM PC hardware and run MS-Dos via the *Acorn PC Emulator*, it is useful to know which discs will operate best.

Under the DES scheme, schools picked by their LEAs and selected grant-maintained schools will test equipment for classroom suitability. Schools not taking part should contact their local authority for a copy of the document.



CUMANA'S NCET-APPROVED CD-ROM DRIVE

The NCET report includes a new CD-Rom drive for the Arc range from Cumana. It uses the latest CDFS interface software, and plugs into the machine by means of the SCSI interface provided.

Accessing the drive via the *Acorn PC Emulator* allows users to run MS-Dos CD-Rom discs. The drive is Econet compatible and supported by Level 4 fileservers, enabling users to select files, and download them to their workstations for use within other Risc OS applications. Prices start at £699, but educational orders received before 25 October will be at the NCET list price of £379. Contact Cumana at Pines Trading Estate, Broad Street, Guildford, Surrey GU3 3BH. Tel: (0483) 503121.

MATHSCOPE

MATHSCOPE, a series of 10 programmes for seven to nine-year-olds, is to be broadcast weekly from 16 September, writes David Watkins, the BBC Education Officer.

Targetting Key Stage 2, levels 2 to 4, each programme highlights a particular subject such as data handling, routes and maps, the calendar and the 24-hour clock and shows, through a documentary element, how mathematical concepts often form the basis of everyday activities.

Part of the programme is based in a newspaper office where the supplement for a local paper is produced on an A3000. Seeing the assembly of puzzles, quizzes, and recipes not only provides examples for follow-up work in the classroom, but also gives children a chance to see what advanced computers can achieve.

A further element is based around an adventure playcentre, where the A3000 is used not only to produce maps, newsletters, posters and banners, but also to run a tombola stall at the summer fair, and to produce a report for the council when the playcentre is under threat.

Standard Archimedes software such as *Draw*, *Genesis*, and *Pendown 2*, are used in the series, and the output from packages such as *Paint*, *Edit*, *Armadeus*, *FontFX* and *Signwriter* can be seen. Acorn has produced an information sheet of software used in the series, with the addresses and telephone numbers of suppliers.

Teachers will find it useful to record and watch each programme before use in the classroom so that they can plan related activities. They will also be able to pause the tape at specific points, giving pupils the opportunity to solve some of the problems themselves.

The teachers' notes and accompanying book include photocopyable worksheets, and suggest relevant games and projects to further develop children's understanding of maths. The program will be broadcast at 10am, Mondays and Thursdays, on BBC2. For more information phone BBC Education Information on 081-746 1111.

BAU SHOW

EDUCATION will play a major part at the *BAU* show in October. Newshounds from St Bede's, in Cambridge, will be producing a daily newsletter using ESM's *Desktop Folio*. Look out for *Freedom*, AVP's new hypermedia package, and Spacetech's astronomy program, *Orrery*. 4Mation are offering free demo discs of *Poster*, *Smart* and *Chameleon* in exchange for a blank disc.

Sharon Halpern

NEWS IN BRIEF

● **COMBINING COMPUTERS** with kindergarten education is still a relatively rare practice and, perhaps not surprisingly, there are few books available on the subject.

Mary Brailsford's book, Using the Computer in the Early Years, will therefore be welcomed by many nursery teachers as a valuable source of information on topics such as how to locate suitable software, make computer overlays and what to do when it all goes wrong. It costs £4 inc p&p, and is available from Mary at 54 Dearne Street, Sheffield S9 1BD. Tel: (0742) 433946.

● **IF YOU ARE** travelling through Waterloo Station on your way to the BBC Acorn User show on 11 October, look out for the Knowl Hill School stand. Specialising in helping dyslexic children, teachers will be demonstrating how the BBC and A3000 range of computers are used at the school. They aim to raise £250,000 to buy more machines, and to provide bursaries for needy children. Please help them reach that target!

● **IN SHYLOCK GNOMES** you'll need mathematical, map-making and logical skills to guide you through Count Dracula's castle in the search for the missing Crystals of Chaos. The package includes background material and follow-up ideas, as well as a teachers' guide to the castle.

It runs in 1Mb and costs £18.50 from Selective Software at 64 Brooks Road, Street, Somerset BA16 0PP. Tel: (0458) 43079.

● **THREE NEW** programs to look out for this autumn are HiLighter, Recall and Glimpse, from Sherston Software. HiLighter is a data handling package that enables the user to create and link pages of graphics and text together; Recall is a powerful yet simple-to-use database that includes pictorial representation of searches, and facilities for spread sheets and graphs; Glimpse displays miniature versions of all your Draw and sprite files and is designed for use alongside any DTP or design work. Simply browse through and click on the required image to load it into Paint or Draw.

Due for release in October, HiLighter and Recall will be under £50, and Glimpse less than £10. Contact Sherston at Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH. Tel: (0666) 840433.



ARCHIMEDES

A3000 PRODUCTS

Monitor stand (A3K1) Probably the best monitor plinth available for the A3000 & the basis of a modular system. £24.95

System housing (A3K2) When you are ready to expand the A3000 this system housing is added, allowing up to 2 floppy drives and a hard drive to be added. £69.50

Expansion card case (A3K3) If you are adding an expansion card ('podule') to an A3000, such asa hard disc card, then you will need this podule case to connect & protect the card. £14.95

Disc buffer (A3K6) If an extra floppy drive/s is to be connected then you will requirea disc buffer. This one supports up to 3 additional drives and incorporates software control for physical to logical drive mapping & 40/80 stepping which could prove essential when using discs in 65Host or PC emulator. A key feature is the built in expansion for further cards to be added internally; also see A3K12. *NB some cheaper products may only provide connection for an additional drive without buffering.* £48.95

20mb hard disc (A3K7) A 20 mb hard disc drive ready to fit in A3K2, including the hard disc card and all cabling. We are not aware of any other hard disc upgrade that is treated as an internal upgrade (consult your Acorn dealer or call PRES for details). £399.00

40 MB hard disc (A3K14) as A3K7 but twice the capacity. £499.00

3½" additional floppy drive (A3K8) 3½" disc drive & mounting brackets for A3K2. £75

5¼" additional floppy drive (A3K9) 5¼" disc drive & mounting brackets for A3K2 – ideally suited for 65Host or using the PC emulator. £99.95

65Host 1770 DFS & DFS Filer (A3K12) A ROM & disc upgrade forA3K6 provides – 1) a desktop DFS filer that allows DFS filesto be dragged to ADFS viewers or straight into applications as Edit or Pipedream. 2) BBC 1770 DFS for use in 65Host. Automatic Icon and loader which can allow BBC DFS discs to have <SHIFT BREAK> operation. "...effectively turns your A3000 into a model B..." Acorn User Sept '90. £19.95

All prices exc. VAT

"PRES's range of add-ons offers tremendous advantages. The system can grow with your pocket, it offers security and strength but most importantly it offers choice." (AU Feb.90)

The starting point is the monitor plinth, probably (we feel definitely) the best on the market @ only £24.95 (plus VAT), from there . . . System Housing, Hard Disc Upgrade, Additional 3½" Disc Drive, Additional 5¼" Disc Drive, Podule Case, Dedicated A3000 Disc Buffer, 1770 DFS for BBC Emulator & DFS Filer for Desktop, plus more to come! (the last three products can be added independently of the other items)

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ACORN TAKES THE BISCUIT

BY THE TIME you read this, Acorn will have expanded it's support to include that of the national and international Fidonet network of bulletin boards. This means that any board that is connected up to Fidonet can share in the new Acorn Echomail conference area. As there are thought to be 10,000 Fidonet BBs in the world, with over 300 in the UK alone, this should gain an even wider audience for the Archimedes.

Each night, Acorn will download the messages sent to the Archimedes Echomail area and, where appropriate, a suitable reply will be returned the following night. In this way, Acorn can publicise and share news, technical notes and telesoftware.

However, Alastair McGregor, Acorn's Customer Service Manager, said 'the new system is not designed as an easy method of sending electronic mail to contact Acorn.'

'One of the traditional roles and major strengths of bulletin boards is for users to provide help for one another. Only where we feel that there appears to be a problem that cannot be answered by the users themselves and that we are in a position to be able to respond will we actually do so,' said McGregor.

He went on to stress that the Fidonet conference would not be used to talk about future products and that Acorn will not respond to gossip or general queries.

Acorn's existing Support Information Database (SID) will continue to be a viewdata service, providing user support, mailing and downloading facilities. The advantage of Fidonet, however, is that this allows users much more flexibility in the range of available download protocols and messaging options.

Acorn has initially opened up an Acorn corner on Tug2, a key Fidonet regional hub. This in turn is linked to the Enigma BB. During the next few months Acorn hopes to increase this to other BBs, helping to provide a national coverage around the country.



THE NEW ACORN AREA ON ARCADE

Tug2 and Enigma can be contacted on (0905) 775191 and (0905) 795002 respectively, at all speeds up to 9600/9600 baud.

FEATURED BB

This month's featured BB is a system run by Dugold Holmes in Surrey. It is called The Animation Station, or Tas for short. Tas seems to be growing rapidly and has lots to interest both Archimedes and BBC owners. New and updated areas are appearing virtually daily – with the latest area being specifically designed for Archimedes owners. Reviews, information and useful addresses are also provided.

Tas is also one of the few non-commercial systems to offer prize competitions and quizzes. Each quarter a prize awaits the highest scoring person on each of its online games; *Hangman* and *Janken*. *Janken*, based upon the popular children's game *Scissors, paper, stone* is simple, yet pretty addictive.

Music, video and general interest areas will appeal to anyone who want to browse through more than just computer chat. There are specialist areas set aside for a variety of topics, spanning Sega games consoles, Ample music, *Elite* and body building. Tas also has a comprehensive online shopping area, supported by the national distributor Disking. Via Tas you can order discs, cables, printer paper and a whole selection of computer stationary. All you need to do is quote your credit card number and Tas will fax Disking directly with your order.

An expansive telesoftware section includes a big selection of downloads for not only the BBC eight-bitters and Archimedes but also Amiga, ST and Psion Organisers, of which the last may appeal to Psion-owning Acorn Users.

Tas is a viewdata (7E1) board which you can call on (0372) 743809.

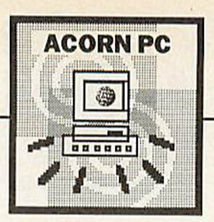
VIRUS WATCH

A new virus has been discovered which, while not fatal to your system, can cause various system errors such as 'memory full'. It installs itself as a module called Net Manager, so it should be reasonably easy to spot.

It has been discovered on a couple of BBs, which have now deleted the affected files. If you do suspect that your machine has been affected, you should run one of the various virus checkers available. On receipt of a blank formatted disc and SAE, I will send you a copy of my PD *Guardian* virus checker.

NEWS IN BRIEF

- We are reliably informed, by someone who is fed up with people whistling in his ear, that a mistake crept into last month's column. The Challenger BB is on (021) 445 3913 rather than the number published.
- Arcade BB (London 081-654 2212) has been upgraded to include a new fast access line on 081-655 4412. The board also now includes the Acorn Echomail (see main text) which allows you to download numerous text files containing technical notes and Acorn press releases. A range of Acorn supplied telesoftware is also available to download, such as the latest Risc OS printer drivers and *ChangeFSI* etc.
- Racal-Milgo has just launched yet another fast modem. The V32bis Maxam VII+ range now offers 14.4K bps transmission and is 50 percent faster than 9600/9600 V32 modems. This compares at around 600 percent faster than standard 2400/2400 (V22bis) modems. Also coping with V42bis data compression, the desktop model weighs in at a hefty £999+VAT. Racal-Milgo can be contacted on (0256) 763 911
- Pace has updated its Linnet range of desktop modems. Now finished, in a snazzy looking black and featuring new front panels, the specification has been enhanced to 9600bps. Prices start at only £159 for the Linnet Plus (V21 and V23 only), increasing to the Linnet 24 at £299 (V21,V32, V22 and V22bis) and end at the flagship Linnet 32 with V32 and V42bis costing a competitive £599. All are fully Hayes compatible and have battery backup. Pace can be contacted via (0274) 532000 or by Prestel MBX (274729306)
- By the time you read this, Dataflex Design should have started selling its new Pocket ISDN adapter (to be launched in September). You should also be able to use the device as a modem, as it supports the Hayes set of programming commands and should work with most communications software. Catering for V110 it allows two Dataflexs to talk to each other at a whopping 38.4Kbps. A revised Pocket Comfax is also to be launched, which has the ability to send and receive faxes, in addition to keeping 2400 (V22bis) and MNP4/5 communications.



NOW WE ARE FIVE

MAJOR NEWS floating around the PC world this month concerns operating systems. Both major and minor contenders have new versions of Dos released or due very soon. Already available is Microsoft's long-awaited MS-Dos 5, which has undergone a serious revamp to rival DR-Dos from Digital Research.

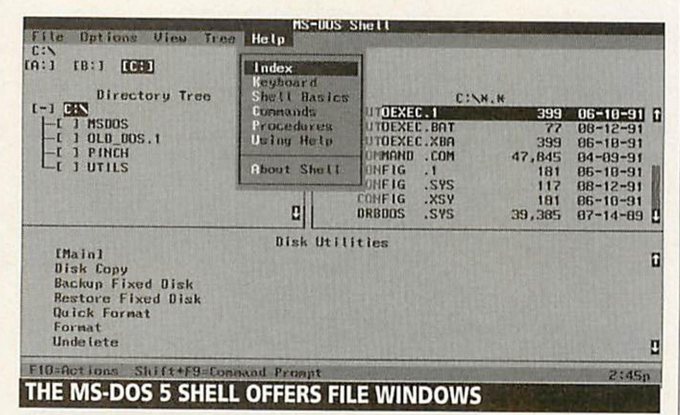
MS-Dos has undergone several important changes. Version 5 has solved the lack of space problem by moving most of itself up into high memory, an area of Ram above the first 640K available for programs under Dos. This frees extra main Ram for running programs. It's now possible to have over 630K free. On a 2Mb Archimedes, without worrying about expanded or extended PC memory, MS-Dos 5 leaves over 590K free.

It's not just the extra memory, though; there's a new front-end program called DosShell. As well as providing an easy to use front-end DosShell performs primitive task switching. You can run an application from the shell and switch back to it before running another application. The first application is suspended but is left in situ. However, it provides no cut and paste facilities between applications.

The third main improvement is the provision of QBasic, a cut-down, version of Microsoft's best-selling *QuickBASIC* compiler. QBasic provides a programming environment and a second version of its program editor is included, a replacement for *Edlin*.

There are numerous other changes to the operating system, such as a history of recently typed commands and the ability to recall them. There's also a sophisticated undelete mechanism, which can undelete files and even unformat whole disks.

Acorn is still evaluating MS-Dos 5, with a view to replacing DR-Dos 3.41, currently offered with Learning Curve A3000s. From this point of view it would appear to be a good swap.



THE MS-DOS 5 SHELL OFFERS FILE WINDOWS

NEW HORIZONS

MS-Dos 5 can be seen as a response to the introduction of DR-Dos 5, which has sold well and has a good reputation.

Digital Research, the creator of DR-Dos, has just been bought out by Novell, the leading network producer. This is being seen as a good thing for Digital, as Novell has a lot of the marketing muscle that Digital has not recently shown.

Waiting in the wings, for a launch at the PC Business Show at the end of September, is DR-Dos 6. This is another attempt to steal some of Microsoft's thunder and put Digital Research back in the Dos limelight with third party suppliers like Acorn. It's quite possible that Acorn is looking seriously at beta copies of DR-Dos 6, while 'evaluating' MS-Dos 5.

DR-Dos 6 is rumoured to include one big advantage over MS-Dos 5 – true multitasking. With this feature built into the operating system, it would be a good product for even the very basic PC, or machines running PC emulators!

SCREEN GRABBING

Each month as this column is put together, there comes a point where an accompanying screen has to be grabbed. This shouldn't be difficult. They can be converted into PCX or Tiff files, which *Translator* should then be able to display and save as a *Paint* sprite. All this works swimmingly with PC graphics files, but the same isn't true of the text screens.

Currently, a program called *Pinch* is used to grab the screen. This works well enough, and using the sister program, *Punch*, the screen can be accurately redisplayed within the PC emulator. Another program from the same suite, *PixToPcx*, should then convert the proprietary Pix file which *Pinch* produces into a PCX file, which retains colour information and is compatible with *Translator*. The screen, from the current PC emulator, is in CGA mode, 640 × 200 pixels – a medium resolution Philips monitor can display it well. However, *PixToPCX* needs an EGA or VGA screen to perform the conversion.

OK, it's a cheat; this conversion is carried out on a true PC with a VGA screen, connected to a multisync monitor. The file is then imported using *MultiFS* and is then loaded into *Translator*, which promptly goes haywire. It's trying to switch mode to display the VGA resolution screen, 640 × 480 pixels, and the monitor can't lock to the scanning frequency. The only way to make the conversion is to uncouple both monitors and swap them over, running the Archimedes into the multisync. Having made the translation, the monitors are swapped back and the sprite file can then be imported into *Impression* as the page is composed. There must be a simpler way – any offers?

Simon Williams

NEWS IN BRIEF

- It seems to be the season for takeovers. The language and database producer, Borland, has bought out Ashton Tate, most famous for its dBase database. Ashton Tate has been ailing for some time, while Borland has gone from strength to strength, riding high on sales of its Turbo products. It looks likely that Borland's Paradox and AT's dBase will continue to be marketed in parallel.
- One function sadly lacking from MS-Dos is a move function. This can be partly remedied with a short batch file. Try typing this into a text editor and then saving the file as MOVE.BAT:

  @ECHO off COPY %1 %2 ECHO Now delete original file(s) with: DEL %1

  You can use MOVE.BAT much as you would use COPY and can include paths in both source and destination file specifications. The '@' character suppresses the echoing of the ECHO statement itself.
- The XDEL command in DR-Dos, lets you delete files selectively. If you type something like XDEL *.TXT, you will be offered the chance to delete each file matching the specification, in turn. It's a much safer choice than DEL.
- If you find your emulator hard disc partition restricting, you may find Stacker interesting. Although it comes in two versions, one software-based and the other a combination of software and hardware, only the software product is of interest to Acorn users. Stacker is a real-time compressor which creates a large single file and pretends this is a separate partition on the disc. Files are automatically compressed on saving and decompressed on running, with little loss of speed, Stacker is available from the Ctrl Alt Deli on (0908) 662759 for £99 plus VAT.
- If you're looking for a good PC wordprocessor which won't break the bank and will run at reasonable speed on an emulator, try LetterPerfect, from the market leaders Wordperfect.

  This is a cut down version of the full product but still offers footnotes, graphics handling, spell-checking and a thesaurus, even an outliner. It is operated with pull down menus and can handle true Wordperfect files with aplomb.

  The price has been reduced to £169+Vat. Call (0932) 850500.

BARGAIN HUNTER

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- Arrive at the newly extended Wembley Exhibition Centre between 10.00 hours and 18.00 hours during the period: Thursday 5th December to Sunday 8th December.
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Please return your completed order and full payment to: The Christmas Computer Shopper Show, BLENHEIM PEL, PO Box 2, Ellesmere Port, South Wirral, L65 3EA. Closing date for ticket application 29th November 1991.

BAU/1

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NEXT MONTH

BBC ACORN USER

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Chris Drage looks at how games can be used creatively to help children learn

MATHSCOPE

We look behind the scenes of this BBC education programme to find out how computers can solve your maths problems

A TO Z OF FONTS

Everything you wanted to know about fonts, but were afraid to ask

Watch out for the November issue of BAU – available October 10 1991

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For the computer user on the move there is a whole range of new portable printers to choose from. We sort out the best from the rest

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Following on from our successful A3000 First Steps series, we continue our review of useful applications with a look at the *Acorn DTP* package

PC EMULATOR

Acorn's new *PC Emulator* software is now available for the Archimedes. But how good is it? Don't miss our review

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HardCard45 Specification

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Access time	25mS
Expansion	SCSI bus for adding up to 6 further hard drives
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Size	120x190x47 mm
Fitting	Can be fitted by the user
Price	

HardCard45 £349

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The HardCard100 gives 100Mb with a 9mS Access Time





The Colour Digitiser for the Archimedes is now available

At last a single eurocard colour digitiser for the Archimedes which produces beautifull results in colour. The H1000 uses desktop software to allow the user to easily access the numerous features, including the ability to digitise images from a VCR, Video camera or even a Laser Disc player.

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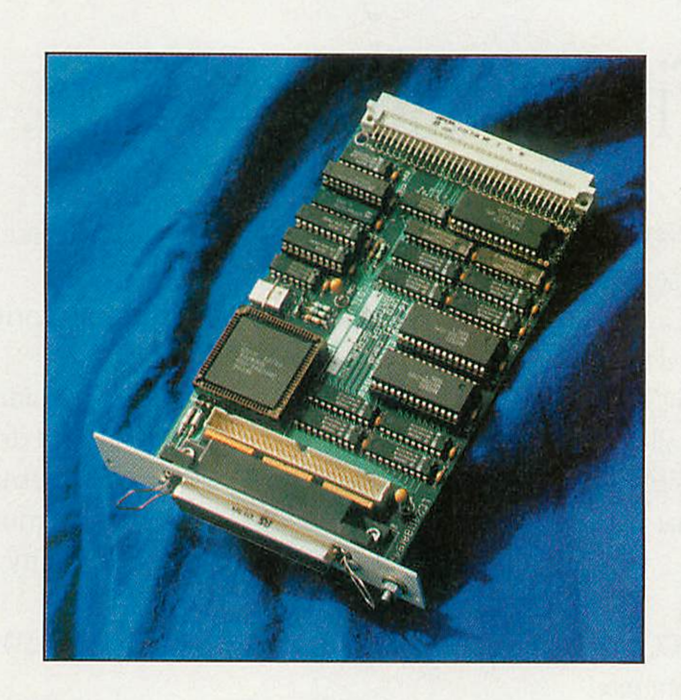
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The A3000 expansion card comes in a colour coordinated steel case which fixes to the rear of the A3000. The hard disc mechanism is enclosed in a separate steel case (also colour coordinated) with switch mode power supply and fan to ensure that the unit remains cool.

The 400 series expansion card occupies a single expansion socket and can support both internally and externally mounted devices. It is fully compatible and will coexist with any existing ST506 drive.

Each expansion card will support up to seven SCSI devices including hard discs, tape streamers, solid state discs, CD ROM players etc. (providing the appropriate software to drive them is installed).

The SCSI system is designed to comply fully with the ANSI X3.131-1986 standard and to give full Acorn RISC OS compatibility.

Full technical information (including data transfer speeds) are available on request.

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400 SCSI Interface	£149

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£15 STAR LETTER

As a new reader I am enjoying the support given by the magazine to my efforts to make full use of my recently acquired A3000.

But what can I do in the meantime when minor things appear to be wrong? I typed in the *Squiggle* program by Barry Wicket (Listing 7 in the July issue of *BBC Acorn User*) but when I try to run it I get the message 'Out of data at line 560'. I have not made a typing mistake. Can you help please?

A similar thing happens with the updated *Clever Atoms* program by Laurie Howe (Listing 6 in the June issue). When I ask the computer to play I get, 'Unknown or missing variable at line 1890'. Again, it is not because of a typing error.

I do not know enough about programming to correct these faults myself. Could there be minor printing errors in reproducing these programs in the magazine?

Mrs C A Moore
Rickmansworth

At the risk of provoking an onslaught of mail, a mistake in the yellow pages is virtually impossible. They used to be done with a scalpel and Cow gum, but since *BBC Acorn User* went DTP, they are done on *Impression*, and a special program has been written to take the working listings and turn them into text. From this state they are simply dropped into frames, so the listings you see are the exact representations of those that are tested exhaustively by our team of techies.

When checking for errors that crop up after you've typed them in then don't just look at the line that gets reported. For instance, an out of data error could mean a missing comma in the data statements at the end of the program. One way to check this is by looking at the last figure in the array that the data was read into, using PRINT entrance(3,4), and see if this tallies with the last figure of the data.

When you get a 'no such variable' error list the line and PRINT each variable on it to see its value, you can then see which one is causing the problem. It's then a case of finding all references to this in the listing on the yellow pages, and checking them with your program.

TRYING IT ON?

I read the reply in *BBC Acorn User* September 1991 from Chris Humphries of Acorn, explaining that there were now many more programs for the Archimedes.

While not in a position to disagree with Chris I have experienced a most frustrating problem as a recent convert from BBC to Archimedes. That is, even if there is a supply of software and books, it is impossible to go into any shop and see it and try it out.

Whereas other commercial software is much in abundance, items for the Arc are nowhere to be seen, and I am speaking here of general provincial computer retailers, good bookshops and libraries.

I spent the whole of a Saturday morning trekking to pick up a copy of the *Programmers Reference Manual*, at £70+petrol, only to find that instead of a guide to programming it was a highly technical manual, of course, had I seen it in a bookshop I could have made a much more sensible decision and saved myself some money.

Local bookshops are full of guides to MS-Dos, *dBase*, *Wordperfect*, but Risc OS, and Basic 5? I questioned the shop assistant, and ultimately the shop blamed Acorn for not sending representatives.

I cannot decide which database or wordprocessor to purchase because I cannot try any of them out, and not everyone does demonstration discs like Colton or Beebug. So good for them!

It seems that once you've purchased the computer Acorn cease to provide backup.

Graham Conridge
Bedford

With our reviews we give you an insight of which software or hardware to buy, and our advertisers are generally pleased to help if you drop them a line. Keep your general queries coming in. we can't answer every one of them but we can reflect what you want to know in our editorial pages.

BOARD COMMENT

We were disappointed with the comments made about the Watford Electronics board in the review of three 8Mb Ram boards (Mega Memory, *BAU* August issue). We feel that the review omitted many salient points and that certain comments were based on assumption, rather than on test results.

There are several issues we would like to clarify. Fitting can be carried out by anyone with the confidence to do it. A purpose-designed tool and full instructions are provided.

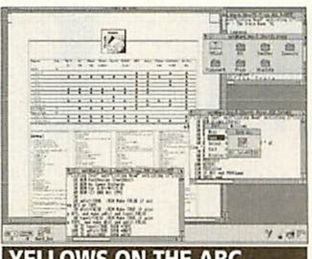
There are two versions of the Watford upgrade, the R840 (for older A440 machines) and R840/1 (for the A440/1).

For future expansion, the Arm processor card and an upgrade to Arm3 are available on our A3 card.

The review claims that the Watford board may overheat. It is well worth noting that when fitted, the A2 and A3 processor boards are deliberately positioned as close as possible to the ventilation slots in the Archimedes case. The positioning of the board has hardly any effect on the air flow through the fan, and actually results in increased air flow to the front vents in the lower case, improving the cooling of the on-board Ram.

Excess current drain is not usually a cause for overheating, and the four single in line memory module devices contain nine 128k DRams, while the ninth is unused, and draws only about 1ma per module in practice. The total current drain in times of peak memory activity is around 2 to 3 amps, so the 4ma is negligible, and will add no strain on the PSU, nor cause any overheating.

The four Simms are not positioned directly over the on-board memory, but on top of our board, behind the disc drive, where Arm 3 upgrades are also fitted. There are no components above them that can be affected by heat.


YELLOWS ON THE ARC

There is also adequate air space around the MEMCs and the heat-sinking ability of the four layer PCB is more than enough to remove the mere 350mw of power that each MEMC dissipates.

Due to the kind of current drain expected, it is unwise to rely simply on the power pickup pins in the MEMC and Arm chip sockets, which is exactly why we have tapped our board directly into the Archimedes power supply, using the plug-in piggy-back spade power leads.

The other boards have ribbon cables to join the podule master board to a slave board. This results in the loss of a podule slot, which is why a great deal of work was done to ensure that the Watford board eliminates such a cable.

The review states that the Arm chip can only address 16Mb of Ram, when in fact it is the MEMC that sets the lower limit to 32Mb by its physical address structure, but the Arm can address up to 64Mb of Ram.

The *FourMeg command exactly emulates a 4Mb machine, as it is implemented in hardware. The Watford plug headers were custom made for the Arm and MEMC sockets, and time has proven them to be extremely reliable.

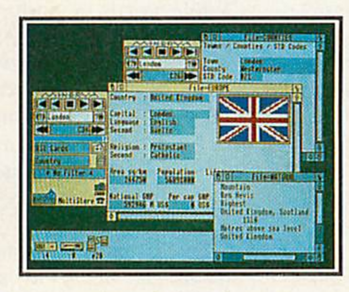
Many points in the review are incorrect or misleading and personal opinions are expressed that the reader may believe are facts. We are convinced that the Watford board is technically superior, the most economic and the pick of the bunch of the 8Mb boards available for the Archimedes.

Keith Archer
Watford Electronics

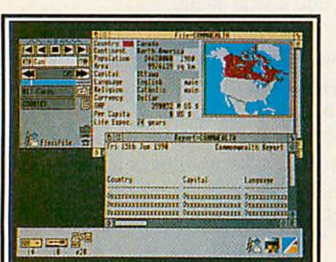
These and similar concerns raised by readers are answered by our reviewer, Tom Carrion, on page 23.

MINERVA

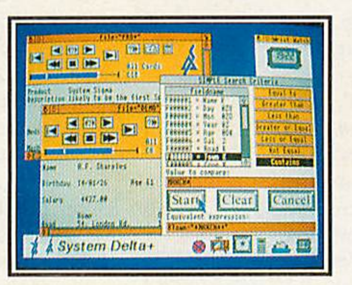
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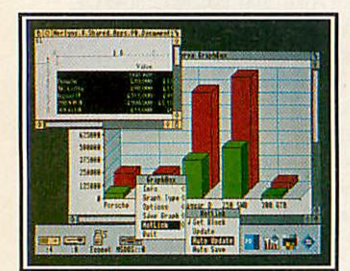
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FLEXIFILE The perfect database for education and small business users. FlexiFile is a new powerful multi-tasking database with friendly screen displays. Multiple files may be open at the same time with relational linking between any two files. FlexiFile allows fast sorts to be carried out and with its soundex searching allows even mis-spelt items to be found. Mathematics can be performed using the macros while indices allow you to browse the records in more than one order without performing sorts. FlexiFile lives up to its name giving the user full flexibility with ease of use. **£153.22 inc V.A.T.**



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MEMORY SLIP

TOM CARRION revisits his review of the Watford 8Mb memory upgrade board

FOLLOWING the review of 8Mb upgrades boards (*BAU* August issue), the magazine has received some letters from readers concerning some of the criticisms of the Watford board, which I reviewed alongside products from Atomwide and Gnome.

Typical is this one from Michael McGuiness of Liverpool, who wrote:

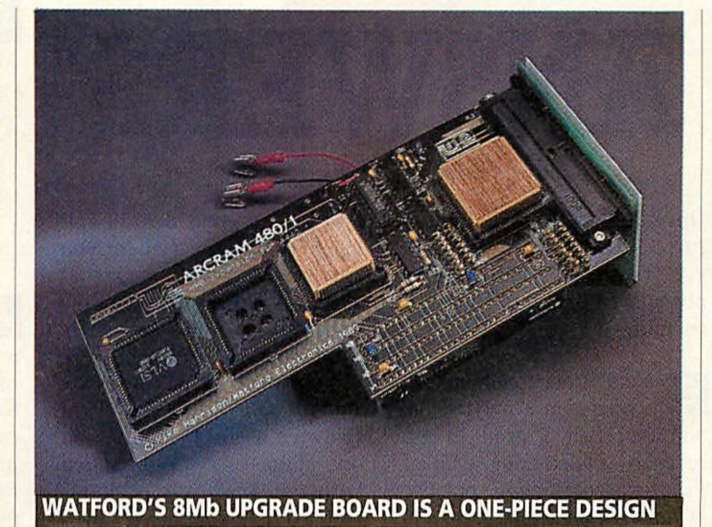
'I have an Archimedes 420 with 40Mb hard disc and MIDI interface, which gets pretty heavy usage.

'I read your review with a sense of bafflement as, some six weeks ago, I fitted the Watford 8Mb upgrade (with the same company's Arm 3). Actually, my 11-year-old son did most of the fitting, but I certainly would not have thought it a 'dealer-only upgrade', particularly for anyone who had expanded their old Beeb.

'However, what did concern me about your article was the reference to overheating. It was not until I'd read this twice that I realised you had not actually confirmed whether the board was operating within the Arc's tolerances. All I can say is my own has functioned faultlessly and has been a first class addition to an excellent machine.'

In the light of this and other letters, and having reread my original review as printed, I would like to point out some omissions from my original text, and correct some of the criticisms made which were based more on assumption than hard evidence.

In the conclusion I said of the Watford board: 'So many could just plump for the cheapest and not really care about what may happen if it works.' My original text included the words 'after all, it works, doesn't it', meaning a board which works well and is inexpensive offers good value to the buyer. One vital section



WATFORD'S 8Mb UPGRADE BOARD IS A ONE-PIECE DESIGN

of text (opposite), which had to be cut for space reasons, explains and illustrates the advantages of the Watford one-piece design over the other ribbon-cable designs.

I was critical about possible power consumption and heat dissipation in the Watford design. Readers have informed me that constantly running machines, for up to one week in one case, showed no heat build-up problems.

My opinion of the Watford design was that it seemed to block off air circulation within the machine, but extensive heat tests would have been required to confirm this.

Therefore, my statement was not fully proved and, in fact, no such heat problems occurred during normal use.

In terms of power consumption, extra power is obtained directly from the computer's power supply by using 'piggy back' spade connectors, in addition to the power obtained by plugging into the motherboard MEMC and Arm sockets. So the Watford upgrade places a comparable demand on the power supply to the other upgrades.

Although the processor cards used by Watford do not allow the use of any other third-party Arm 3, the board does allow quick and easy upgrading with other Watford products and Acorn's future Arm processors.

Although I suggested fitting of the boards should be by dealer only, Watford supplies full installation instructions and a chip extraction tool so that purchasers can fit the board at home. As no soldering is required for this, your machine guarantee would be unaffected by the procedure.

The *FourMeg command disables (in hardware) the extra 4Mb of Ram. In my sentence: '...it is not possible to totally emulate a 4Mb machine...' I meant that the extra MEMC is still 'in circuit' and, therefore, the computer not really the same as a machine with only one MEMC.

However, once the *FourMeg command has been executed, the slave MEMC will not 'see' its memory and, therefore, the machine will behave as if it only had 4Mb, so my original statement was irrelevant.

Finally, although the answer to my query to Watford concerning the compatibility of the board with the old style 400 machine was 'no', I have subsequently been informed that a 400 series Watford upgrade is in fact available – namely the ARCRAM 480.

NO RIBBON CABLES

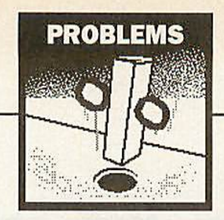
Acorn designed MEMCs to be 'daisychained' together, with one acting as a master and controlling all the usual MEMC functions, in addition to looking after 4Mb of Ram. Further MEMCs are treated as slaves and act purely as memory controllers. In this master/slave configuration, special care must be taken (in hardware design) to ensure that all the MEMCs are running at the same speed and, more importantly, that they are synchronised, meaning that the clocking pulses for each chip are exactly the same.

On the A540 each 4Mb plug-in card comes complete with a slave MEMC on the card – all the necessary synchronisation is built into the main circuit board. Upgrading an A440 is not so simple. Acorn made no provision for adding extra MEMCs into the original design, so the additional controller must be 'patched' into the memory circuitry somewhere. As accurate synchronisation is crucial, master, slave and the memory should be as close together as possible.

This was only true of Watford's board. Each of the others has a ribbon cable separating either the MEMCs (Gnome) or the memory (Atomwide).

AN APOLOGY

Reviews of hardware are a combination of test evidence and the reviewer's opinions. They are also subject to the magazine production process, which often calls for material to be cut or changed to fit the required space. We regret a combination of these factors resulted in a review which presented some misleading information concerning Watford's product, which offers advantages including compact design and low cost. We apologise to Watford Electronics and to readers and hope that this article clarifies the situation.



QUESTIONS AND ANSWERS

Q I have been using a 80-track floppy disc drive with a BBC model B Micro, for a number of years. It is still working well but I think I would be better off if I had a 40/80 switchable drive. I therefore want to know whether it is possible to upgrade the drive so that it will function as a 40- and 80-track switchable disc drive.

J Millican
Carnforth

A It is most important at the outset to realise that some disc drives can be converted to be used as 40- and 80-track disc drives while others cannot. It actually depends on the components used when the drive was constructed. An important feature here will be the ability of the disc drive's head to be able to read and access tracks that are closer together. If you are going to proceed, two possibilities are available to you regarding the upgrading of the disc drive.

You could consult a BBC dealer who specialises in disc drives to see if the upgrade path is feasible. This dealer may be prepared to supply you with the parts you need and instructions, but it is more likely that they would want to do the work.

In the past small companies like Manus Electronics of 33, Pool Lane, Winterley, Sandbach, Cheshire, CW11 0RZ manufactured kits for the conversions you require. Whether they are still in business I am not certain.

Q I am about to embark on a course at a polytechnic and feel that I need to get ready by undertaking a bit of Pascal programming practise at home. I own a BBC model B have recently begun to write programs in Pascal using the Acornsoft ISO-Pascal package. I am finding it rather difficult, having never really got to grips with programming in this language before.

Mr D Tailor
Leicester

A As you are a beginner to programming with Pascal you will really need far more than the Acornsoft package's manual to help you to come to grips with the language. As Pascal is a very popular teaching language and used a great deal in colleges and universities you will certainly find books at the level you require to make progress at the University Bookshop.

You may find the book *Pascal for Basic* by P J Brown a useful beginning. At one stage this was supplied with the Acornsoft package. But even if you have this I would recommend a more advanced beginner's book to help you develop with the language.

I wonder if your problem is not understanding what the language expects of you. One characteristic of Pascal is its insistence that the data type is every variable be declared before use. Not only that, but Pascal also allows you to define your own data types. In a procedure definition the type of each parameter is explicitly stated and you can only pass variables of the correct type to that procedure. This strong data typing helps to structure the program and often highlights potential errors caused by the mismatch of data types at an early stage of program development.

Q I have a BBC Master 512 and want to use a British Micro GrafPad 8000 with this computer. I understand that the GrafPad 8000 is PC compatible. Is it possible? If not what graphics pads and what CAD software can I use?

Francesco Russo
Tolmezzo, Italy

A The GrafPad you have is normally connected to a IBM PC or compatible by means of the serial port. Due to the slow speed and limited control of the serial communications on standard IBM PC and compatibles, most programmers illegally access the serial port.

This means that most programs that use the serial port on the Master 512 will not work properly. This even happens when the programs use legal Dos calls as they cannot find the PC serial chip and therefore fail. Some programs also insist that you select a serial port COM1: or COM2: and cannot deal with AUX, which is the Dos Plus serial port.

Due to the serial port problems already mentioned it will be difficult to get any graphics tablet to function

POSTING YOUR PROBLEM

If you have a particular problem with an Acorn micro, commercial software or a program you are trying to write yourself, then BBC Acorn User might be able to help. The BAU Post A Problem service guarantees to give you a personal answer to your problem within 10 working days – and for just £4.

Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you require recorded delivery, please add the cost of this.

Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments.

The Post A Problem service will answer the problem and return all corresponding material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you just can't lose!

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correctly on a BBC Master 512 when operating in IBM PC mode. Therefore there is little point in recommending suitable software that is pad compatible. However version 1a of *AutoSketch* is keyboard compatible and that Borland's *Turbo CAD* version 1 also works.

Q I have an Archimedes 310 that has been upgrades to 4Mb with the IFEL add-on. This is used with the NEC 3D colour multisync monitor which is causing me some problems. Some areas of the screen have a green tint and text is sometimes distorted at the top of the screen in some of the multisync modes. Why does this happen?

Mr Eric Geddes
Bracknell

A With older Archimedes computers there has been a green tinting problem with white and grey area. This is caused by Acorn putting the video sync on the green line. This can be remedied by taking the computer to your dealer and have two Field Change Orders (FCOs) carried out. These are FCO28 and FCO29.

The problem you have with distortion does occur on the top few lines in Modes 18-20 of some NEC 3D monitors. NEC admits this problem and says that there is nothing that can be done as the Archimedes output is slightly different to the IBM output which is catered for. A home-brew modification is possible but that would involve splitting the sync signals and as that probably would means the cutting of the legs of a chip on the motherboard it isn't really recommended.

Q I am one of those people who are never satisfied. I know the Archimedes has the best graphics of any micro for its price but I want to improve the graphics further. I have seen adverts for VIDC enhancers – what are they for?

Jim Granter
Sandbach

A A VIDC enhancer allows the video controller chip to be switched to a higher speed. This permits higher resolution screen modes, meaning more dots per screen. Do note that some of the projected 256 colour modes are not possible as the Arc's Memory controller (MEMC) cannot feed 256-colour screen information fast enough.

Q I have a BBC Master 128 and I am considering upgrading to a BBC A3000. I am however concerned about the hardware, software and data that I have built up over the years and whether I can use any of it with the A3000.

Ewen K Collins
Kirkcaldy

A You will be able to use both the dot matrix and daisy wheel printers you own with a BBC A3000. You will be able to use your 5.25in disc drive with the A3000 too. But you will need an additional interface. Beebug markets one for about £35.00. Having a 5.25in drive connected to your A3000 will be very useful for interchanging software and data from your old BBC Master 128 to the new machine.

Your new A3000 would be capable of reading your ADFS disc with no problems. Risc OS has been provided with the ability to read three different ADFS formats. This includes the older 640K L format that the Master 128 used. If you don't want to convert all your DFS discs to ADFS format you can by a useful package from Dabs Press called *ArcDFS* which allows the A3000 to read discs created in the older original Acorn DFS format.

The BBC A3000 is supplied with two software-based BBC emulator packages. So you may be able to run the family tree software you have used for some time. You may find that the software house that developed the original package has brought out an improved version for the Archimedes and BBC A3000.

ACORN CUSTOMER HOTLINE

Acorn has introduced two new products offering a complete environment for Risc Os programming with the Desktop.

Acorn Desktop C is a development environment for programming in ANSI C. Acorn Desktop Assembler provides the same environment for Archimedes Arm assembly language. The two products can be used separately, or together for mixed C and assembler programming.

The C compiler of Acorn Desktop C is a full implementation of C as defined by the 1989 ANSI language standard, tested with Plum-Hall Validation Suite version 2.00. It is supplied with ANSI and Risc Os specific libraries.

At least 2Mb of RAM is needed to run Acorn Desktop C or Assembler. A hard disc is recommended for serious use and is required to use both products together.

Acorn Desktop C and Assembler can be supplied by your local Dealer. The cost of Acorn Desktop C is £229 ex VAT and its product code is SKB75. The cost of Assembler is £149 ex VAT and its product code is SKB76.

Acorn is offering upgrades for current owner of the C and Assembler packages. The cost of the upgrades is as follows (all prices include VAT and p&p):

From C Release 3 (SKL80) to Desktop C £99.87. From C Release 2 (SKL70) or 1 (SKL28) to Desktop C £123.87. From Assembler (SKL64) to Desktop Assembler £88.12. From Software Developers Toolbox (SKL58) to Desktop Assembler £88.12.

To obtain their upgrade, owners should send in:

Their name and address, their original disc (disc 1 only for the C products, the utilities disc for the Software Developers Toolbox.) and a c0heque or postal order, made payable to "Acorn Direct", for the price indicated above to:

DDE
Acorn Direct
13 Dennington Road
Wellingborough
NorthantsNN8 2RL.

The upgrade offer is open until January 1st 1992.

The PC Emulator upgrade offer closes on 31 October 1991. If you have not upgraded yet and wish to do so please refer to the article on page 25 of the August 1991 issue of BBC Acorn User for details of the upgrade. Please note that MS-Dos 3.3 is not supplied with the PC Emulator upgrade.

You are requested to retain your MS-Dos 3.21 disc to use with the new emulator, as this is the version that you will currently hold a licence for. MS-Dos 3.3 offers no significant advantages over 3.21 and therefore it was sensible to save customers the cost of an additional licence.

Please remember that Acorn Customer Services are not able to deal with any technical enquiries over the phone. If you have an enquiry that your local Acorn dealer is unable to help with, please write to Acorn at the following address:

Customer Services
Acorn Computers Limited
Fulbourn Road
Cherry Hinton
Cambridge CB1 4JN

Many users are uncertain how to use the Mailman application supplied with the Archimedes. The following account should clear up a few of the problems in setting up and running this (details on what MailMan does can be found in the User Guide supplied with your computer).

The MailMan application is only suitable for those with a network and the following is the best way to install the application.

In order to have a central copy of MailMan to which all users have access it is necessary to set the following variables within the user's own !ArmBoot file.

- Mail$Current (eg. to NET:&.Mail.Current)
- Mail$LogFile (eg. to NET:&.Mail.LogFile)
- Mail$Name (eg. to Fred Smith : Class 2X3)
- Mail$Source (eg. to NET:&.Mail.Intray)

When MailMan starts it checks to see if these above variables are set. If they are, it does not alter them. It is important to ensure that the full pathname, including the filing system is specified. This will enable you to redirect certain files to local storage areas. It is very important that the file pointed to by Mail$Source has public write access.

In just FOUR days time you could have FOUR MEGAbytes of RAM in your Archimedes 310







Parallel









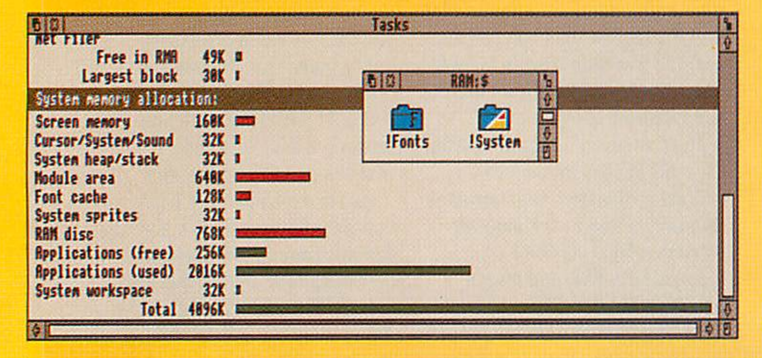

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With 4 megabytes of RAM in your 310, you'll be using a new computer altogether. A large RAM disk can hold !Fonts, !System and datafiles so everything happens more quickly. Large applications like Impression and Multistore can co-exist in RAM and each have multiple files open at the same time. Pipedream and Presenter can exchange "live" data. RAM also opens up multisynch screen modes, brings faster printing times and quicker copying.

DAY ONE *Pickup*

DAY TWO *Fitting/Testing*



DAY THREE *Testing/Despatch*



DAY FOUR *Returned*



The Graphics Enhancer

24 Bit Colour for your Archimedes

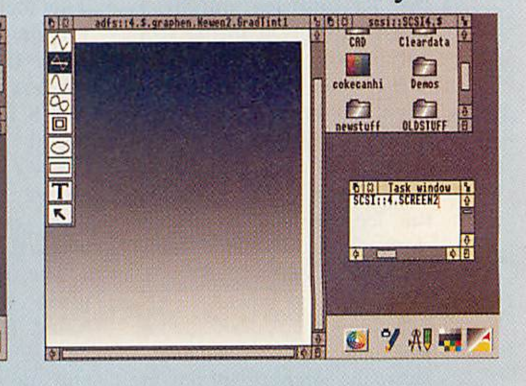
"This board is an essential peripheral"
Micro User July 1991

"A major improvement over the machine's existing graphics capabilities"
Acorn User July 1991



The Cokecan in 24 bit colour

Grey scale without Graphic Enhancer



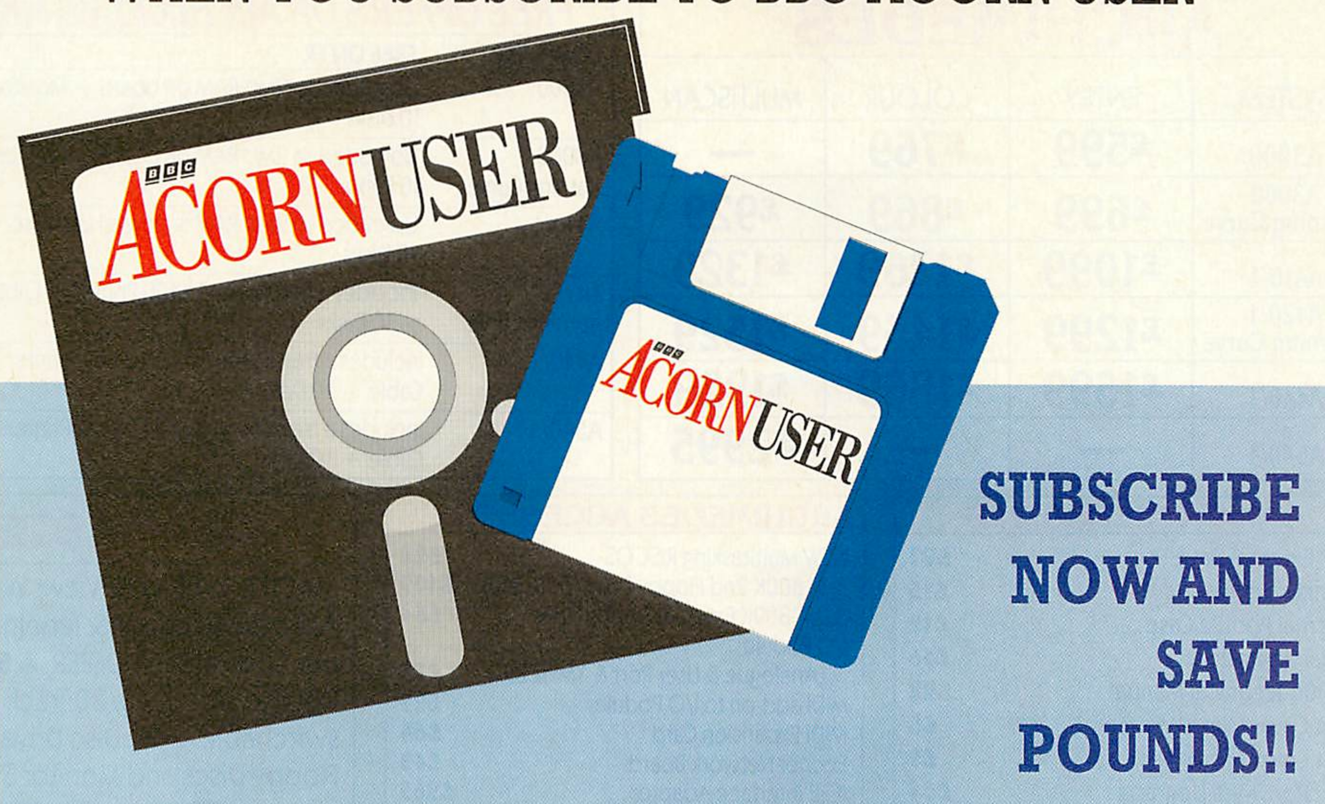
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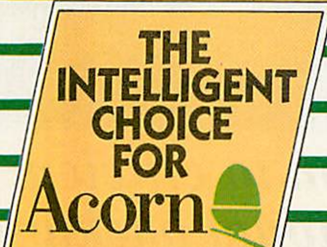
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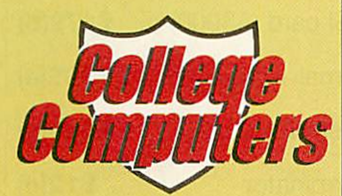
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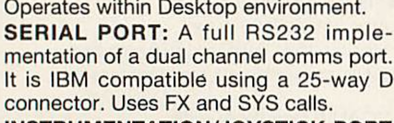
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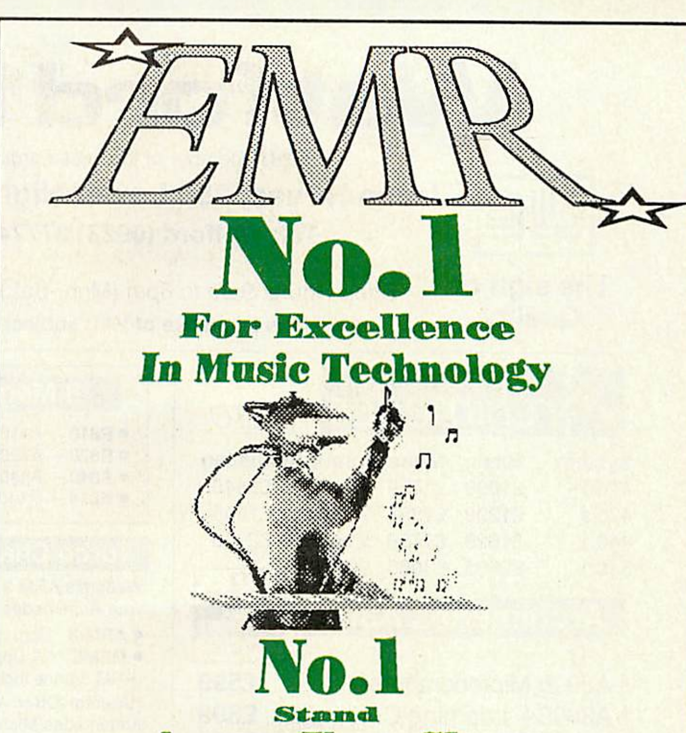
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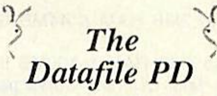
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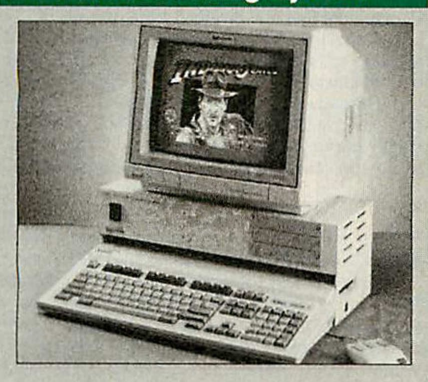
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Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

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Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

Price: £125

Archimedes A300/A400 SCSI Hard Disc Offer
(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £999
Offer Price: £399

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
- A300/A3000 £21
- A400 £25

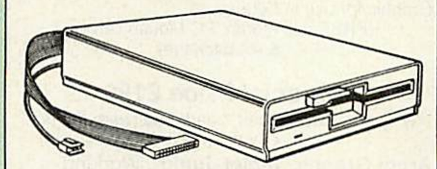
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399**

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during September

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£115
Econet Module for the Master	£45
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Ecolink	£270

Staff Vacancy

Due to recent changes in our pioneering R & D Department, we now have exciting new vacancies for an Archimedes Hardware designer and a machine code software engineer to join our team in developing Watford's innovative Archimedes products.
If you have an in-depth knowledge of the computer's hardware and/or are well versed in Archimedes machine code, why not awrite in and send us your CV, or call Keith Archer or Shiraz Jessa for an interview.

Desk Top Publisher

Acorn's Archi DTP Package	**£108**
Impression 2 DTP Pack	**£130**
Impression Junior	**£72**
Tempest DTP Package	**£90**

Archimedes New Product Launch See Pages 2, 5 & 14

Archi Wordprocessors

Pendown Archi	£48	Archie Spell Master	£25
Wordwise + Disc	£24	PD Spellchecker	£40
Image Writer	£25	View	£45
Interword Disc	£24	Graphic Writer	£19
1st Word Plus – 2	£63	EasyWord	£30

Databases

AlphaBase	£36	Multistore	£195
Knowledge Organiser	£42		

Spreadsheets

Intersheet Disc	£24	Viewsheet	£45
Sigmasheet	£39	Schema	£89

Business Graphics

GammaPlot	£39	Sigmaplot	£39
Interchart Disc	£17		

Integrated Packages

- Logistix £79
- Pipedream 3 £119
- Desktop Office – Database, Graphs & Charts, Wordprocessor Spreadsheet, Communications £98
- Desktop Folio – Wordprocessor, Desktop & Interactive Publishing. Ideal for school environment. £85

NEW A3000 BBC User, I/O Card, Analogue Port IIC Card

This NEW versatile I/O Card from Watford, fits inside the A3000 and includes an Analog to Digital Converter, a User Port, and an InterIC (IIC) connector.

The card allows many of the peripherals developed for the BBC to be used with the Archimedes A3000. The ADC and User Port have the same pin out and connectors as the BBC computers.

Extensive RISC OS software is supplied to provide BBC OSBYTE calls for support of the ADC and User Ports, including the BASIC keyword ADVAL. The software provides extended RISC OS support for separate interrupts from both the ADC and User Ports, permitting easy interrupt driven operation.

The card is provided with all the software in ROM and is automatically loaded when the machine is turned on.

Peripherals connected to the ports can obtain up to 500mA of power at +5V. A fuse is fitted to the card to protect the A3000 from damage arising from accidental short circuit of the power output.

The card is provided with an extensive manual explaining installation, all software commands, connector pin outs, hardware addresses and example programs.

Features
- An 8 bit User Port with a standard 20 way IDC connector, compatible with the User Port on the BBC computers and the Archimedes I/O Podule.
- A 10 bit Analog to Digital Converter with a standard 15 way D type connector, compatible with the ADC on the BBC range of computers and the Archimedes I/O podule.
- An InterIC (IIC) Port with a 5 pin DIN socket to connect the A3000 to external IIC devices.

£42

Continued→ → → → → → → → →

Archi A4 Scanner



This most advanced Archi A4 image scanner is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the IHELP application on the Acorn applications discs. The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.

Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.

Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

New Low Prices:

Archi A4 Scanner	£349
Sheet Feeder for above	£95
Scanner + Sheet Feeder	£419

(Dealers Inquiry welcome)

Z88 Portable Micro



£185

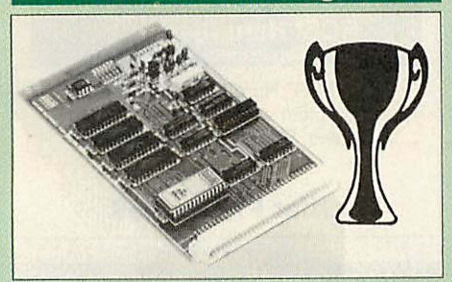
FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

- 32K RAM Pack or 32K EPROM Pack £18.00
- 128K RAM Pack or 128K EPROM Pack £42
- 512K RAM Pack £175
- Z88 Eprom Eraser Unit £33
- Z88 Spellmaster for Pipedream £40
- Z88 Carrying Case £8
- Z88 Computing Book £9.95
- AA Nicad Rechargeable Battery £1.50
- Battery Charger Compact & Fast £6
- Z88 Serial Printer Cable £8
- Z88 Parallel Printer Cable £25
- Z88 to Archi Link £15
- Z88 to BBC Link £20
- Z88 to PC Link II £30
- Z88 to Macintosh £52
- Z88 Mains Adaptor £9
- Z BASE £56
- Z TAPE £42
- Z TERM £42
- Z88 Modem £149

Archi Real-Time Digitiser



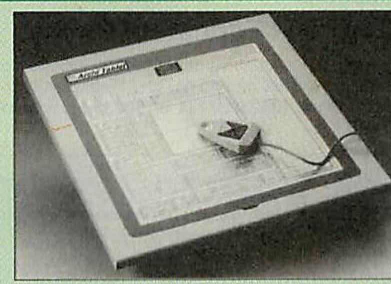
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).

(FREE this month, PC Mouse Drivers & Art package)

Special Price £199

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£15**

Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus **£125**

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2

Acorn & Watford DFSs

- Watford sophisticated DFS ROM £16.00
- Watford DFS Kit complete £69.00
- We will exchange your existing ROM for Watford's ultimate DFS ROM at only £12.00
- DFS Manual (comprehensive) £6.95
- Acorn DNFS ROM £17.00
- Acorn ADFS ROM only £25.00
- Acorn 1772 DFS ROM Kit £49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

- SPECIAL PRICE **£44.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.



3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

- *10 x 5.25" S/S D/D 40T (744)* **£5**
- *10 x 5.25" D/S D/D 40T (745)* **£5**
- *10 x 5.25" S/S D/D 80 Track (746)* **£7**
- *10 x 5.25" D/S D/D 80 Track (747)* **£7**
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* **£9**
- *10 x 3.5" S/S D/D 40/80 Track* **£7**
- *10 x 3.5" D/S D/D 40/80 Track* **£7**
- *10 x 3.5" Double Sided High Density* **£13**



Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 x **M3** 3.5" D/S D/D 80 Track* **£7**
- *10 x **M9** 3.5" D/S High Density* **£12**
- *10 x **M4** 5.25" S/S D/D 40 Track* **£5**
- *10 x **M5** 5.25" D/S D/D 40 Track* **£5**
- *10 x **M7** 5.25" D/S D/D 80 Track* **£7**
- *10 x **M8** 5.25" D/S H/D Hi-Density* **£9**
- ***M2** 3" Double Sided* **£2.50 each**

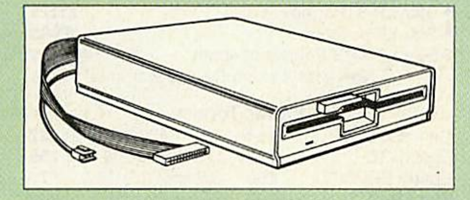


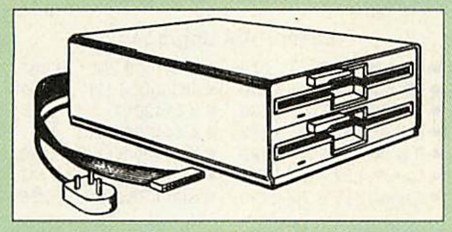
CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted.
Various UK "manufacturers" of disc drives for the BBC Micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.
If you look around the popular BBC Micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space. Your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double Plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. *(Turn to the 6th page of our advert for the Plinths).*
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"



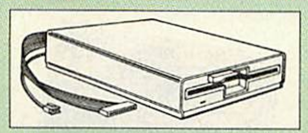


Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• **CLS400S:**	Single, 40/80 track 400K Double sided Drive	**£72**
• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£142**
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	**£82**
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£155**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Disc Drive/DDFS Offer



- The popular CLS400S 40/80 track switchable disc drive.
- Watford's popular Mk II DDFS Interface (allows up to 720K storage). Will run both in single & double density modes.
- A comprehensive DFS Operating manual

Bargain at Only **£116** (Offer valid until stocks last)

3.5" DISC DRIVE

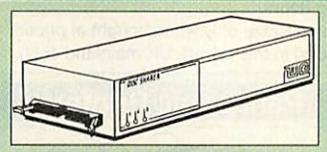


These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	**£62**
• **CLD400S:**	Twin Disc Drives, 800K	**£109**
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	**£83**
• **CD35:**	Twin Disc Drives, 800K	**£126**

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

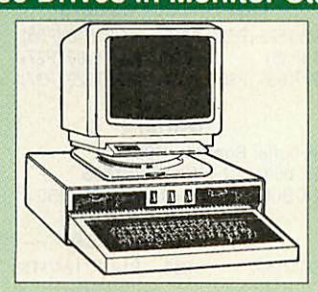
Disc Drive Sharer



(Ideal for educational establishments)
A low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC Micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables **£55**

Disc Drives in Monitor Stand



• **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

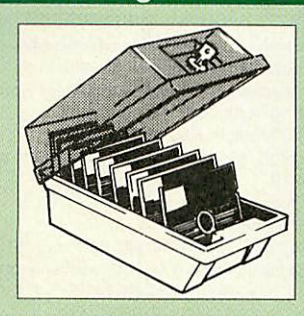
£154

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

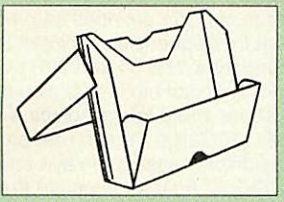


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs. **£1.50**
Holds up to 10 x 5.25" Discs. **£2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

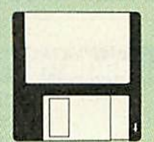
Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

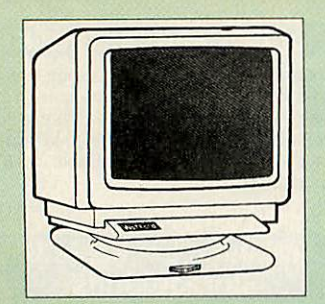




BULK PACK DISCS in lots of 100

Type	S/S 40T	D/S 40T	D/S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£29 for 50		£52 for 100

Continued→ → → → → → → → →



Microvitec Monitors

- **1431** – Standard Resolution Monitor £169
- **1451** – Medium resolution, suitable for word processing in mode 0 £209
- **Cub3000** Medium Res for A3000 £189
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

Now 3 years Parts & Labour warranty on all Microvitec Monitors

Multiscan Colour

Eizo 9060S	£389	NEC 5D	£1179
Eizo 9070S	£579	Taxan 770LR	£370
NEC 2A	£245	Taxan 775	£369
NEC 3D	£323	Taxan 795	£405
NEC 4D	£629	Taxan 875	£669

- VIDC Enhancer Board £25

(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

NEW Aries AlphaScan Monitor

Pound for Pound, the AlphaScan VGA Multiscan monitor provides the maximum performance and greatest flexlbility of any 14" colour monitor.

Its multiscan circuitry provides automatic adjustment for frequencies between 30 and 60KHz horizontal, and 50 and 90Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The Multivideo VIDC Adaptor supplied (free) with the monitor allows high resolution operation in all screen modes.

£325

Philips Monitors

- **BM7502** 12" Hi-res Green Monitor £67
- **BM7522** 12" Hi-res Amber Monitor £67
- **CM8833** 14" Med. Res Colour Monitor £170
- TV Tuner for CM8833 Monitors £62

Dust Cover for Philips Monitors £6

FREE Swivel Base with Philips CM8833!

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £169

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

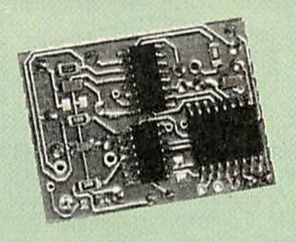
Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12



Watford VIDC Enhancer



This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A WIMP application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: This provides support for both VGA and Multisync monitors. A unique electronic design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control **£45**

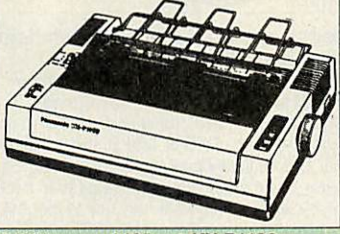
MultiVideo VIDC Card: As above but for MultiScan monitors only. **£25**

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Laser Printers, Roland Plotters and of course the full range of Archimedes Micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours.

(Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Panasonic Printers



KX-P1081	£105	**KX-P1180**	£99
KX-P1123	£144	**KX-P1624**	£285
KX-P1124I	£194	**KX-P1654**	£399
KX-P1170	£POA	**KX-P1695**	£285

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-1124 (P36)	£79	KX-P1180 (P37)	£66
KX-P1624/1695 (P38)	£124	KX-P1123 (P37)	£66

Buffers

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 £32 **P19** P1124/1180 £49

Citizen Printers

120D Plus	£96	124D Printer	£139
Prodot 9	£196	Prodot 24	£219
Prodot 9X	£245	Swift 24#	£205
Swift 9	£129	Swift 24X	£264

- Prodot Cut Sheet Feeder £120
- Swift 24 Colour Option £29
- Swift 24 Ribbons Black £4 Colour £13

Special Offer this month – A FREE Colour option cartridge with every Swift 24 printer purchased from us.

Star Printers

- **LC10** 9pin 80col. 144/36 CPS £105
- **LC15** 9pin 136col. 180/45 CPS £173
- **LC24-10** 24pin 80col. 180/60 CPS £143
- **LC24-15** 24pin 136col. 200/67 CPS £288
- ***FR10** 9pin 300/76 CPS 31K 16 fonts £210
- **FR15** Wide carriage version of above £260
- ***XB24-10** 24pin 80col. 240/80 CPS £269
- **XB24-15** 24pin 80col. 240/80 CPS £345
- **XB-24** Colour Kit £29
- **LC-200** Colour 9pin 80col. 180/45 CPS £152
- **LC-24-200** 24pin 80col. 222/67 CPS £150
- **LC24-200** Colour 24pin 80col. 222/67 CPS £217

*FREE Colour Ribbon with these printers

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC/XB24-10; 15; LC200 £55

Ribbons

LC10; LC10-II; LC15	Black £4;	Colour £6
LC-200; LC24-200	Black £5;	Colour £12
XB24-10; XB24-15	Black £5;	Colour £12

Laser Printers

Canon LBP-4	4ppm	£580
Canon LBP-8 IIIR	8ppm	£1499
Canon LBP-8 IIIT	8ppm	£1365
Epson EPL7100	6ppm	£619
HP Laserjet III	8ppm	£999
HP Laserjet IIID	8ppm	£1569
HP Laserjet IIIP	4ppm	£629
HP Laserjet IIIsi	16ppm	£2475
Panasonic KX-P4420	8ppm*	£599
Panasonic KX-P4450i*	11ppm*	£1015
Panasonic KX-4455 Postscript	11ppm*	£1469
Qume Crystal Print Publisher 2		£1555
Star LP-8 II	8ppm	£929
Star LP-8 Star(post)script		£1129
Star LP-4 4ppm		£689
Star LP-4PS Postscript 4ppm		£799

* Now with 2 years On-site warranty

Laser Toners

Canon 2 & 4	£54	KX-P4420/50	£22
Epson GQ	£18	Laserjet III/P & III/P	£55
Epson EPL7100	£95	Laserjet II/D, III/D	£70
Star LP-8	£69	Qume Crystal	£56

Laser RAM Upgrades

IIP & III 1MB	£74	EPL7000 2M	£365
IIP & III 2MB	£109	GQ5000 512K	£95
II & IID 1MB	£76	KX4420/50 1M	£115
II & IID 2MB	£112	KX4420/50 2M	£159
II & IID 4MB	£299	KX4420/50 4M	£349
Canon LBP4 1M	£175	Star LP8 1M	£143
Canon LBP8 2M	£150	Star LP8 2M	£285

Laser Drum & Developer

Epson Drum	GQ5000	£93	EPL7100	£129
Panasonic 4420 Drum		£60	Developer	£59
Panasonic 4450 Drum		£93	Developer	£80
Qume Drum		£76	Developer	£56

Jetpage Postscript Cartridge

- HP IIP/III £255 IID & IIID £265

NEW – HP Laserjet

Various Font Cartridges	£45
Superset Font	£195

Integrex Colour Jet

- Colour Jet 132 Printer £499
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £19.50
- Black Cartridge £11.25
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Hewlett-Packard Printers

• # Desk Jet 500	£285	• Paintjet XL	£999
• Desk Writer (Mac)	£480	• Quiet Jet Plus	£350
• Desk Jet Cartridge	£15	• HP Think Jet	£232
• Paint Jet Colour	£569	• Rugged Writer	£825

Now 3 years extended Parts & Labour warranty

- Paintjet Cartridges Black £19; Colour £25
- Desk Jet 500 256K RAM cartridge £129
- HP Epson FX Emulation Cartridge for Desk Jet £59

HP Apple Talk Interfaces for
- Scan Jet £299 • Paint Jet £POA
- Desk Jet Unlimited (Book No VAT) £19.75

Canon Bubblejet Printers

	Printer	CSF	D'ble Bin	Ink Cart
BJ10E	£178	£43		£18
BJ300	£320	£88	£65	£12
BJ330	£374	£110	£79	£12

- Spare Battery pack for BJ10E £33

NEC Pinwriter Printers

• P20	£175	• P70	£446
• P30	£237	• P90	£635
• P60	£345		

Epson Printers

DFX5000	£1059	LQ860 Colour	£459
DFX8000	£1985	LQ1050+	£459
EX1000 Colour	£428	LQ1060 Colour	£609
FX850	£272	LQ2550+	£685
FX1050	£346	LX400	£105
FX1060	£595	LX850	£146
LQ400	£156	SQ850	£425
LQ550	£204	SQ2550	£628
LQ850+	£377		

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550 £69
EX800/FX800/850/LQ800/850 £130
FX/LQ 1000/1050/SQ850 £159
LQ 2550 £390 SQ2550 £390

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65
- Multifont Card for LQ550/850/1050 £95

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£4
IBM/Archimedes Parallel Lead 5 metres	£10
IBM/Archimedes Parallel Lead 10 metres	£15
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Plotters

• HP7440	£415	• HP7475	£599

Roland Plotters

• DXY1100	£499	• DXY1200	£629
• DXY1300	£830	• DXY2500	£2375
• DPX3500	£3289	• Sketchmate	£315

- Roland plotter Pens, Fibre tip £7.50

Listing Paper (Perforated)

• 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
• 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
• 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
• 1,000 Sheets 15" x 11" Fanfold Paper	£9
• 2,000 Sheets 15" x 11" Fanfold Paper	£16
• 1,000 Sheets true A4 Fanfold Paper 70gms	£11
• 2,000 Sheets true A4 Fanfold Paper 70gms	£21
• Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
DMP4000	£3.75	£4.85
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£8.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£6	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

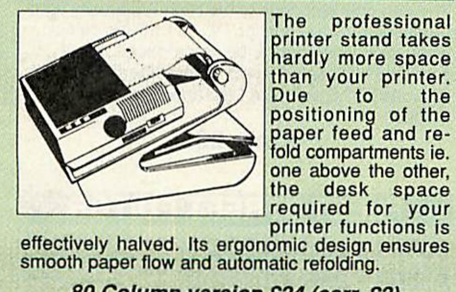
Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595 £6
P115 for KX-P1180 £7 **P145** for KX-P1124 £7
P140 for KX-P1540 £8 **P155** for KX-P1624 £8

Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red £9 each

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires).

(Ideal for School environments)

Connects	Serial	Centronics
2 to 1	£16	£17
3 to 1	£22	£24
5 to 1	£32	£36

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.
Centronics **£18;** Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£40	£45
4 to 1	£62	£59
8 to 1	–	£89

256k Multi Spooler

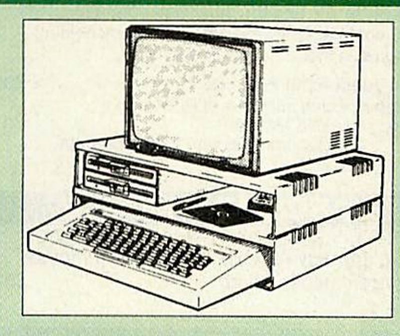
These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out £135 • 4 In/2 out £169
- 8 In/1 out £199

Compact Converter Units

Serial to Parallel £36 Parallel to Serial £37

Plinths for the BBC B & Master 128K Micros

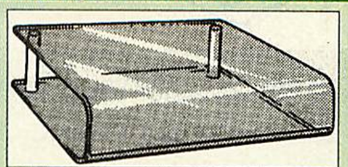


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationery. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

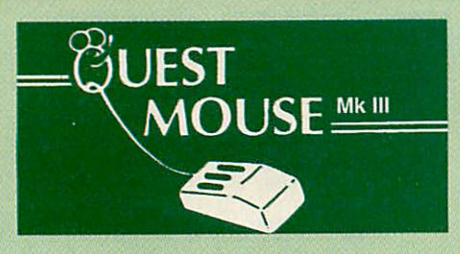
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Continued→ → → → → → → → →



- Quest Mouse III & Quest Paint £59
- Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse III only £30
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18
  (P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software



Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

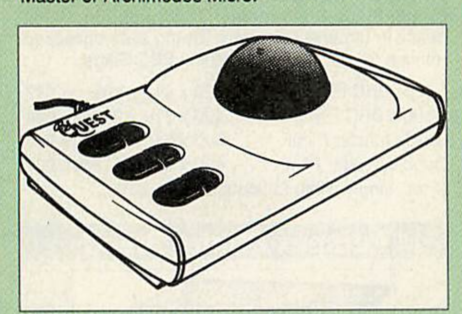
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version **£27**
QT-20 Archimedes Version **£30**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible) £45
RB2 including Quest Paint £75
RB2-A for Archimedes £46

THE NEW Mk III AMX MOUSE

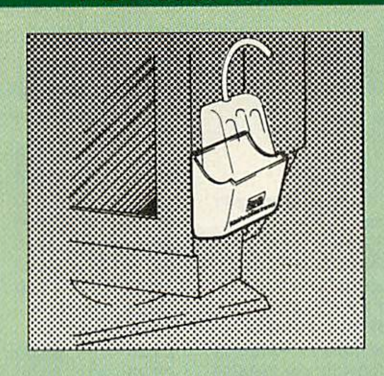
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

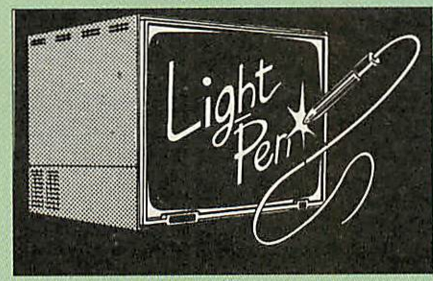
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. At £4 it does not cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

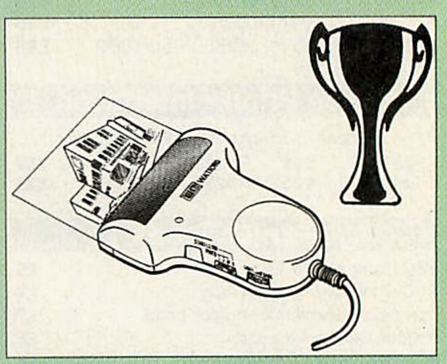
£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

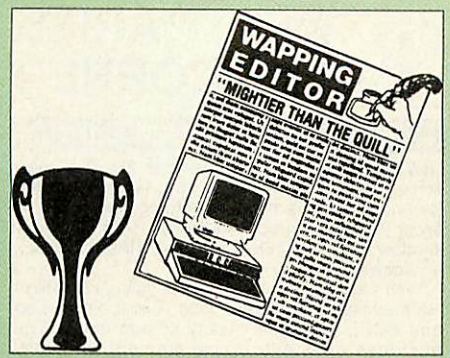
The Beeb HandScan

Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.
The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.
All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£135**



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack £59
Wapping Editor plus Mouse £79

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)



At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

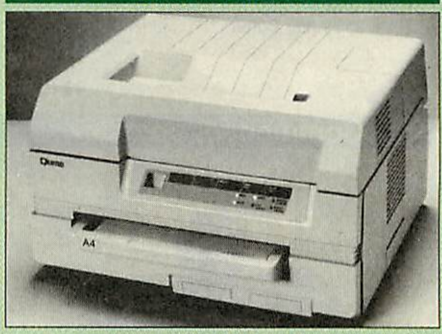
Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions. **£12**

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only). **£13**

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £825

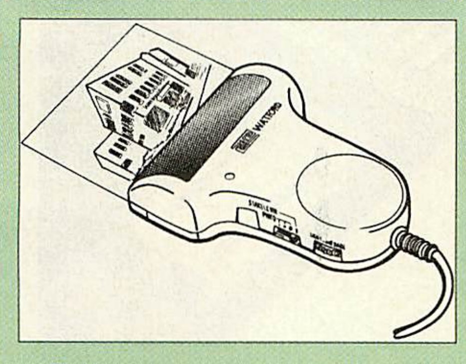
- Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer £325
- LPB8 Printer plus High Res Card £999

(For demonstration, call in at our retail shop)



All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

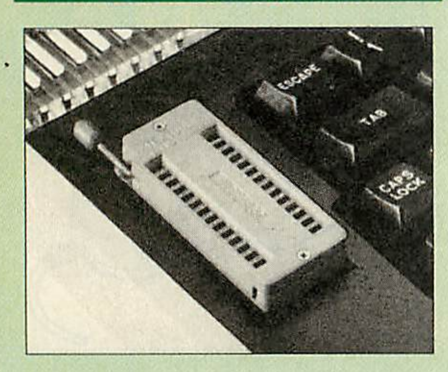
Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

AHS-4 Archi 300/400 Version £149
AHS-3 Archi A3000 Version £175

Continued→ → → → → → → → →

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

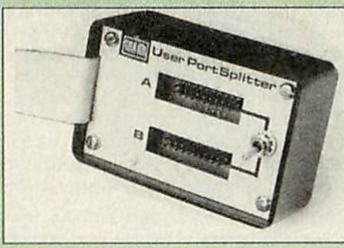
- Complete System **£11**
- Spare Cartridges **£2.75**
- Spare Rack **£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

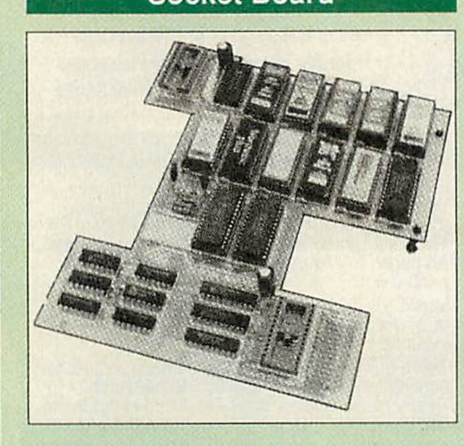
User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

NEW Commander Joystick

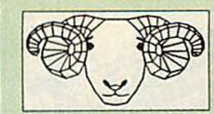


Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:

- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Launch Price: £15



ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

Voltmace Joysticks

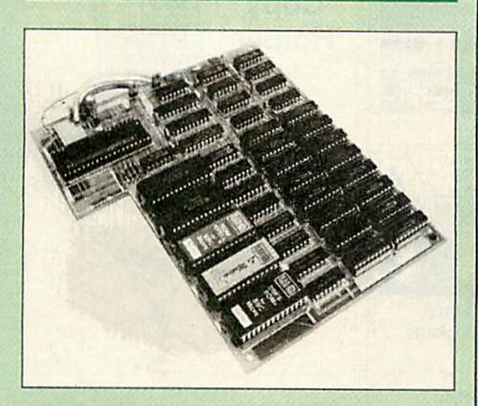
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- ROM/RAM card with 32k dynamic RAM **£45**
- ROM/RAM card with 64k dynamic RAM **£59**
- ROM/RAM card with a massive 128k dynamic RAM **£99**

(carriage on ROM-RAM Card £3)

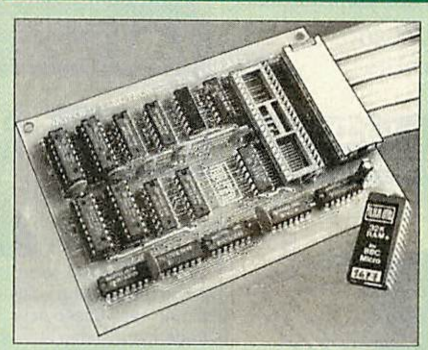
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £9
- 16k Dynamic RAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches £2 each

Complete ROM-RAM board
All options installed £115

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £54 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £20.00
- Maths with a Story 2 (Disc). 4 further maths programs. £20.00
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. £17.00
- ECOLOGY O-Level program. £20.00
- POLYMERS O-Level program. £20.00
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20.00
- ADVANCED TELETEXT SYSTEM £8.65
- PERIOD TABLE SOFTWARE £20.00
- Computers at Work – Primary £17.35
- Introducing Geography 11-17 years £17.50
- Electric Fields 6-14 years £11.25
- Espana Viva – 3 Discs £19.95
- WHITE KNIGHT Chess game £16.00
- A Vous La France £29.00

More Educational Software

- **FUN SCHOOL 2 – Red:** Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a Letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. **£12.00**
- **FUN SCHOOL 2 – Green:** 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump **£12.25**
- **FUN SCHOOL 2 – Blue:** Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£12.50**
- **FUN SCHOOL 3 – Red £19.95**
- **FUN SCHOOL 3 – Green £19.95**
- **FUN SCHOOL 3 – Blue £19.95**
- Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+ **£26**
- More French Games – Another 6 games 12 years+ **£26**
- Au Restaurant and Accident de Route 12 years+ **£26**
- Boulogne and Oh-Les – 2 programs for beginners **£26**
- Letters to French Penpals – 11 years+ **£26**
- French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16 **£22**
- Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+ **£22**
- More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+ **£22**
- The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages **£26**
- An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years **£26**
- Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years **£26**
- The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years **£22**
- PUNCMAN Learning punctuation
  Puncman 1 & 2 for 7 – 13 years **£15**
  Puncman 3 & 4 for 8 – 14 years **£15**
  Puncman 5 & 6 for 8 – 15 years **£15**
- Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+ **£18**
- Letters & Pictures – Introduces phonic skills to Infants 6-8 years **£15**
- Numbers & Pictures – Early number learning is a great fun (4-6 years) **£15**
- Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults) **£15**
- Maps & landscapes No. 1 (9-14 years) **£18**
- Help Your Child learn Basic Map work No. 2 (9-14 years) **£18**
- Pirate – Educational Adventure (8-14 years) **£15**
- Spelling Week by Week (6-14 years) **£18**

Archimedes Software

- Bookbinder **£43**
- BUMPER DISC **£14**
- Bumper Disc 2 **£14**
- Craftshop 1 **£26**
- Craftshop 2 **£26**
- Desktop Stories **£35**
- DigiSim **£35**
- Droom **£19**
- Jiglet **£27**
- Jigsaw **£28**
- Numerator **£60**
- Snippet **£26**
- Fun School 2A Red (up to 6 years) **£12**
- Fun School 2A Green (6-8 years) **£14**
- Fun School 2A Blue (8 years +) **£14**
- Gate Array Teaching System **£68**

Continued→ → → → → → → → → →

Computer Concept's ROMS

Communicator	£49
Disc Doctor	£28
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42
TERMI	£25
Wordwise	£24

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell with 80 track disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
Overview packs 1 & 2	£65
Hi-View	£38

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

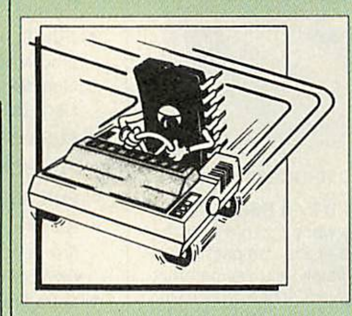
(When ordering please specify for which Micro & 40 or 80 track Disc)

All prices are exclusive of VAT

View Printer Driver Discs

Epson FX & RX 80	£10
Juki & Brother HR	£10

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £29



CREDIT CARD
24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

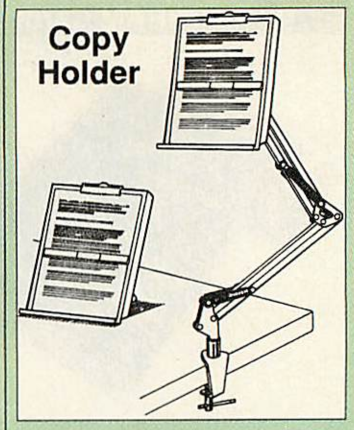
BEEBPLOT – Provides visual representation from Spreadsheet data.

Only £10 (Disc)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £14

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

ALL PRICES EXCLUDE VAT

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£6.95
15 Hr Wordprocessing BBC/WW & WW+	£6.95
30 Hour BASIC (BBC Micro)	£12.95
1st Word Plus Rel. 2 Manual	£10.00
A3000 Technical Manual	£29.00
Acorn DTP A Guide to	£17.00
Advanced User Guide for BBC	**£10.95**
Archimedes 1st Step – Beginners Guide	£9.95
Archimedes Assembly Language	£14.95
Archimedes BBC Basic Guide	£20
Archimedes DTP Manual	£10.00
Archimedes Operating System	£14.95
Archimedes Risc-Os Programmers Reference Manual	£79.00
Arm Assembly Lang. Prog. Manual	£15
Assembly Language Quick Ref.	£21.95
BASIC 2 – User Guide	£2
Basic V – A Dabhand Guide	£9.95
BBC Basic Guide (Archimedes)	£19.95
BBC Computer Handbook – The Complete	**£14.95**
BBC Micro – Within the	£11.95
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C – A Dabhand Guide to	£14.95
C Programming Lang. 2nd Edition	£24.95
COMAL – Introduction to	£9.50
Deutsch Direkt! (Book only)	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
FORTH on the BBC Micro	£9.95
Hackers Handbook – New	£9.95
ISO-PASCAL Reference Manual	£9.95
Mastering Interpreters & Compilers	£14.95
Master 512 Guide – Dabs Press	£9.95
Master Operating System	£12.95
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Master Reference Manual Part 2	£14
Master Reference Manual – Advanced	£17
Mathematical Programs in BBC BASIC	£9.95
MINI OFFICE II – A Dabhand Guide	£9.95
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Example Programs on Disc for above	£4.95
PASCAL on the BBC Micro	£9.50
PASCAL Programming	£10.95
RISC Technical Manual 260 pg	£14.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
Understanding Interword – A Beginners Guide	£6.50
View 3.0 User Guide	£10
View Guide (View 2.1)	£5.00
View, Viewsheet & Viewstore – Mastering	£12.95
Viewsheet & Viewstore Dabhand Guide	£12.95
VIEW Dabhand Guide	£12.95
Viewsheet User Guide	£10
Viewstore User Guide	£10
Z88 – A Dabhand Guide	£14.95
Z88 Computing	£9.95
Z88 Magic	£14.95
Z88 Using Your	£9.95

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1-2-3 For Business	£25.95
1-2-3 Mastering Release 3	£22.95
1-2-3 Mastering – 2nd Ed.	£20.95
1-2-3 Quick Reference	£7.95
1-2-3 Special Edition (QUE) – Using	£22.95
1-2-3 Using – Rel. 3	£25.95
8086/8088 Ass. Language Quick Ref	£8.45
8086/8088 Programming the	£17.95
Ability – Using	£12.95
Accountancy software in Business – Using	£14.95
Agenda – Using	£21.95
Aldus PageMaker – Using	£21.45
Amstrad 1512/1640 Step by Step – Using the	£POA
Amstrad Basic 2 User Guide	£9.95
Amstrad PC Programmers Ref Guide	£7.50
Amstrad PC1512-1640 Step by Step – Using	£10.95
Assembly Language – Quick Ref.	£7.95
Autocad 4th Ed – Mastering	£31.50
Autocad – Mastering Through Rel. 10	£28.95
Autocad – Inside Release 10	£27.95
Autocad – Inside 6th Ed	£32.45
C Introducing	£12.95
C Programming Language 2nd Ed	£26.95
C – Teach Yourself	£19.95
Clipper – Using	£22.95
Computer Users Dictionary	£9.95
Corel Draw Quick Ref Thro V1.2	£7.95
Corel Draw made easy	£24.95
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dBase III Plus Handbook 2nd Edition	£22.95
dBase Instant Reference (III & III+)	£10.95
dBase IV – Handbook	£21.95
DOS & BIOS Function – Quick Ref Guide	£7.95
DOS Instant Reference (up to 3.3)	£6.95
DOS Power Tools (includes a disk)	£45.95
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MS-DOS – Using	£19.95
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Wordstar 6.0 Made Easy	£19.95
Wordstar 6.0 – Using	£25.95

Carriage on Books vary between £2 to £3.50, depending on their weight

New Release

ACORN TO PC

Stop the Confusion!

Do you have to use both Acorn computers and PC's? Would you like to use your Archimedes or A3000 in PC-emulation mode but are unsure of the new commands?

Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

'ACORN TO PC' also acts as a handy reference guide to all Acorn star commands and their MS-DOS equivalents. It also has an extensive and readable explanation of the directory tree and hierarchical filing systems in general. Both DFS and ADFS Acorn systems are covered.

'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £15.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.

Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.

A book you will enjoy to use as a reference, or read from cover to cover, over and over.

Only: **£14.95** (No VAT)

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed.

Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives & read only ADFS and Watford DDFS – not DFS).

Price: £39

(Please write in for technical literature)

Continued→ → → → → →

Panafax Facsimile

Top quality Panasonic Fax machines, at Watford's budget prices. Ideal for Schools, Colleges, Home & Offices. Supplied complete with telephone handset & 12 months on-site maintenance warranty.

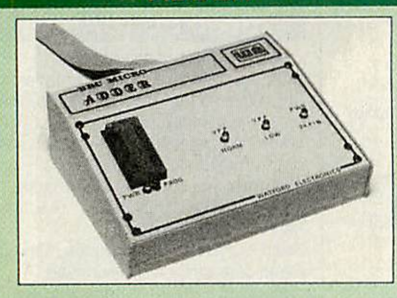
- UF120 £339
- UF121 £349

(P.S. We stock full range of Panafax)

Watford Electronics are:

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- Cambridge Computer Dealer
- Computer Concept Premier Dealer
- EIZO Monitor Dealer
- Microvitec Appointed Dealer
- NEC Appointed Dealer
- Panasonic Premier Dealer
- Roland Plotter Official Dealer
- Star Printer Premier Dealer
- Taxan Appointed Monitor Dealer
- 3M Media Premier Distributor

ADDER



The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.

The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£65 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast.

- **ERASER EB** – Standard version erases up to 16 chips. £34
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. £36
- Spare UV tubes. £12

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Servisol Foam Cleaner

This king size multipurpose foam cleaner spray is ideal for cleaning Keyboard, Monitor, Disc Drive & Computer furniture surfaces.

£2.50

Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

£2.50

Aerosol Dust Spray

Ideal for removing dust & dirt from Keyboard & similar inaccessible spaces. **£3**

Spares for BBC Micro

UHF Modulator	£4	16MHz Crystal	£2
Speaker Grill	£1	17.734 MHz Xtal	£2
Speaker	£3	32.768MHz Xtal	£1
Keyswitch	£1.50	BBC B Refurbish	
Master PSU	£59	Casing	£25
Master Keyboard	£62	Keyboard	£46
Master Casing	£49	Power Supply	£59

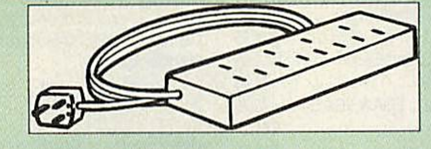
Replacement Flexible 17 way Keyboard Connector £4

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage transient spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£14.95

ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 Way DIP Switch

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

Connecting Leads

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 3 pin DIN Plug + 1 Jack Plug	£2.50
to 7 pin DIN Plug	£3.00
to 3 Jack Plugs	£2.50
6 pin DIN to 6 pin DIN Plug (RGB)	£3.00

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable

Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	50p	75p
RS423 (5 pin Domino)	70p	80p
Cassette (7 pin DIN)	40p	95p
ECONET (5 pin DIN)	35p	50p
Paddles (15 pin 'D')	150p	250p
Disc Drive Plug 4 way	100p	–
6 way Power Connector	120p	150p

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK £8

CHIP SHOP

1 MB-10 DIL D-RAM	£4.50
1 MB ZIP D-RAM	£4.90
256K x 4-8 DIP	£4.75
256K x 4-8 ZIP	£4.80
DS3691	£4.50
DS88LS120	£5.25
LM324	£0.45
SN76489	£5.50
SAA5050	£8.75
UPD7002	£6.00
2764-250nS	£3.00
27128A-250nS (12V5)	£2.50
27128-250nS (21V)	£4.00
27256-2	£3.00
27512-2	£4.50
27C101G (1 Meg)	£7.00
4013	75p
4020	£1.00
4164-10	£1.55
4464-10	£3.50
4816 RAM	£2.00
41256-8	£2.00
41256-10	£1.50
6264LP-8K	£4.00
6502A CPU	£5.00
65C02 3M	£9.75
65C12	£9.00
6512A	£10.00
6522	£4.00
6522A	£5.00
62256ALS-15	£10.00
62256P-12	£8.50
6818	£4.00
6845SP	£6.00
68B50	£2.95
68B54	£7.50
7438	50p
74LS00	50p
74LS04	50p
74LS10	50p
74LS123	£1.00
74LS163	£1.00
74LS244	£1.00
74LS245	£1.00
74ALS245	£2.75
74LS373	£1.00
74LS393	£1.00
75453	£1.00
75159	£3.00
9637	£2.00
ICL7673PA	£3.00

Assorted ROMS



ACORN ADFS	£25
ACORN BASIC 2 plus User Guide	£22
Acorn BCPL	£42
ACORN DNFS	£17
Acorn FORTH	£32
Acorn Graphics	£25
Acornsoft C Disc	£36
Acorn LISP	£19
Acorn OS B+	£25
Acorn OS 1.2	£14
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ICON Master	£28
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Master ULA (47)	£15
Master ULA (60)	£10
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Microtext Disc	£46
Microtext Rom	£199
NLQ DESIGNER	£25
Numerator – Archi	£69
Numerator – BBC	£39
Pendown ROM	£32
Rom Manager	£20
ROMIT	£29
SERIAL ULA	£13
TED	£35
Termulator B, B+	£28
Termulator Master	£32
Video ULA	£14
ULTRACALC II	£26
1Mb OS ROM	£39



Hi-Speed, Low Cost Archi Hard Disc Card

Watford's NEW Innovative IDE interface card brings the latest advances in PC hard disc technology to within reach of the Archimedes user. Over the last few years PC hard disc manufacturers have been working towards the goal of integrating the drive controller onto the hard disc, eliminating the need for an expensive controller card.

Now this has been achieved and drives are available under names such as IDE (Integrated Drive Electronics) or ATA (AT Attachment). These drives require only simple interfacing to a PC motherboard and reduce the overall cost of installing a hard disc. Because of the integration of the controller and drive electronics onto one compact board, manufacturers have been able to include extra features into the drive, such as Caching, where tracks are buffered in fast memory, reducing access times and increasing throughput. All these benefits make IDE drives far more attractive than conventional ST506 drives or SCSI.

Watford's advanced interface allows IDE drives to work on any Archimedes machine, speeds in excess of SCSI devices can be obtained at a fraction of the cost of a SCSI drive.

Up to four drives are supported by the IDE filing system IDEFS, up to two drives can be attached to each expansion card, up to four cards can be installed in a machine. An optional 20Mb or 40Mb hard disc can be supplied on the podule expansion card itself, with its fast transfer rate and power saving modes the drive is ideal for storing commonly used software such as the !Fonts application.

A powerful security feature has been provided with the two unique commands *IDELock and *IDEUnlock, ideal for educational establishments where hacking or tempering may be prevalent that may lead to loss of data. Once locked, the configuration can not be changed until a secret password is used. The !IDEForm Write Protect option is particularly useful in conjunction with *IDELock as it will prevent any unauthorised deletion of data.

By an innovative use of on-board memory, the card will remember its configuration, even if moved to another slot or even a different machine, this also includes the unique security features.

Hardware

- Single width EuroCard
- Supports proposed ANSI ATA (IDE) specification
- Fast 16 bit MEMC interface interrupt driven to support background disc operations
- 5 Mbytes per second peak transfer rate
- Built in Non Volatile RAM to hold configuration
- LED activity indicator
- 37 way D type socket for external drives
- Optional on-card 20Mb or 40Mb hard disc
- Up to two drives (master and slave) per card
- Multiple cards per machine (up to four)

Software

- Conforms fully to the Acorn IDE Specification
- All software supplied in ROM
- Filing system 'IDEFS'
- Desktop filer with drive ready detection and disc name under icon
- !IDEForm, WIMP based configuration and formatting software
- Drives can be individually write protected
- Up to four drives over multiple cards
- Power saving standby modes supported with configurable timeout
- Drives can be used without translation in native mode for minimum overhead
- !IDEFSDisk, creates PC emulator hard discs

*Commands

*IDELock
*IDEUnlock
! DEFS
Selects the IDE filing system 'IDEFS'.
*IDEDrives
Displays the configuration and native characteristics of installed drives.
*Configure IDEFSDirCache
*Configure IDEFSBuffers
*Configure IDEFSDrive

Typical transfer speeds

Prairie Tek	20Mb	650K bytes per second
Seagate	43Mb	800K bytes per second

Prices

Part No.	Capacity	Access Speed	Price
ADA 0520	44Mb	28mS	**£249**
ADA 0530	100Mb	16mS	**£395**
ADA 0570	200Mb	15mS	**£535**
ADA 0580	330Mb	15mS	**£POA**

All the above 3.5" drives are supplied complete with Controller Card, cable & Software on ROM. (Internal fitting). For use with A300/A400/A500 series machines.

For A3000 users an additional external Case and PSU will be required.

AAA 0300 External Case & PSU for A3000 **£85**

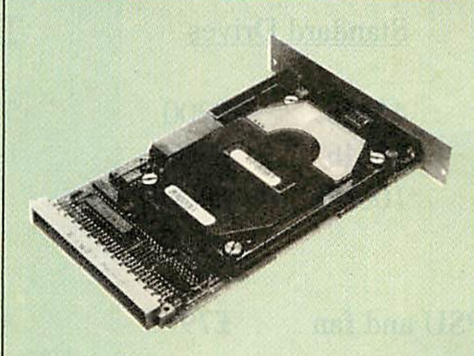
Internal Hard Disc Drives for A3000

ADA 0700	21Mb	23mS	**★£315**
ADA 0720	44Mb	28mS	**£TBA** (Available Soon)
ADA 0730	89Mb	18mS	**£TBA** (Available Soon)

Supplied complete with Podule, Fan, Cable & Fitting instructions.

★ Tentative Launch Price

IDE Hard Card



2.5" miniature Hi-Speed Hard Disc Drives on Controller Cards for Archimedes

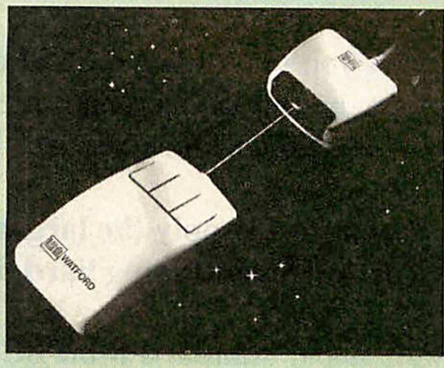
"Simply plug and play"
For Archimedes A300 and 400 series machines

ADA 0650	21Mb	23mS	**£345**
ADA 0660	44Mb	28mS	**£495**
ADA 0670	89Mb	18mS	**£TBA**

(Can be used as a Removable Hard Drive)



Archimedes Cordless Mouse



Ever found that using a mouse on a busy desktop has its problems? The cable is always being caught up in papers, tangled round equipment and other cables etc, and what about that cup of coffee spilled over your work!

Watford Electronics' new Cordless Mouse solves these problems by removing the cause for concern - replacing the cable with a simple infra red link. It still provides all the speed and easy control of a conventional mouse, but with complete freedom. In use, there are no operating differences between the standard mouse and the new cordless mouse so all mouse functions and mouse driven RISC software will be fully compatible. Pinpoint accuracy is ensured by a unique Accelerator button, which, when pressed, moves the pointer by just a tiny amount for a large slow movement of the mouse, but by a large amount for a quick wizz of the mouse.

Features

- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 seconds inactive
- Auto Power Shut-Down after 20 seconds inactive

Price £65

Watford Electronics

250 Lower High Street, Watford WD1 2AN, England
Tel: 0923 37774/240588 Fax: (0923) 33642 Telex: 8956095

Prices subject to change without notice and available on request. ALL OFFERS subject to availability. Mail Order and RETAIL SHOP. Trade and Export inquiries welcome. Government and Educational Establishments' OFFICIAL ORDERS Accepted. Shop Hours: 9.00am to 6.00pm, Monday to Saturday. Thursdays 9am to 8pm. (Free Customer's Car Park). VAT: UK customers please add 17.5% VAT to cost incl. Carriage. CARRIAGE: Unless stated otherwise, minimum £2 on all orders. £3 on Larger items. On bulkier items, £7 Securicor charge applies (UK mainland only). Overseas orders, carriage is charged at cost. Specifications of all products are given in good faith but are subject to change without notice. Some items vary in their availability. Watford Electronics Terms and Conditions are available upon request. Please ring for latest delivery situation.

SCSI and IDE Options From The Serial Port

Wouldn't you like to buy a SCSI or IDE system from a company that gives you a wide choice of solutions, honest advice about the best type of card for you and who are always reviewing and improving their customer service? If so you're reading the right advert!

The Serial Port supply the largest and fastest range of cards for the Archimedes - as well as a range of devices including hard drives, tape streamers, magneto-optical and CD-ROM drives.

As well as our **standard 8-bit SCSI cards** we now have a **new 16-bit SCSI card** which has just been launched and can transfer data at rates exceeding 2Mb per second - certainly one of the fastest and definitely the best looking SCSI card on the Archimedes! Our **Turbo Drives** perfectly complement this card with an ultra-low 9ms access time with cache and are covered by a full two year warranty.

Also new to our range is the **Turbo Internal A3000 SCSI Card** - this uses the same components as our 16-bit card but has been designed to fit inside an A3000 giving higher transfer rates than standard internal cards. Another possibility for the A3000 owner is our 'plug in and go' **HardBox** solution - this is simply a box containing any full size card, drive and fan that plugs into the expansion port of the A3000 keeping your internal slot free for other upgrades. Contact us for the latest availability information on these options.

Also, to give you peace of mind, **all** our cards and many of our devices are covered by a **full two year warranty** - we're that confident about the quality and reliability of our products.

SCSI Cards		Standard Drives		Turbo Drives	
8-bit Full Size	£99	45Mb	£200	50Mb	£250
8-bit A3000 Internal	£99	80Mb	£300	100Mb	£450
Turbo A3000 Card	£139	100Mb	£400		
16-bit Full Size Card	£139				

External metal case complete with PSU and fan £79

A3000 HardBox £55

Syquest Removable 42Mb drive complete with PSU, case, fan and one cartridge £499

Sony Magneto-Optical Drive £3800

When a card and any device are bought together all necessary connecting cables will be supplied.

For information on larger drives or other devices such as tape streamers and CD-ROM drives, as well as availability information on our IDE systems, please contact us.

Educational and dealer enquiries welcome

The Serial Port, Burcott Manor, Wells, Somerset BA5 1NH
Tel: 0243 531194 Fax: 0243 531196

PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

The Pineapple Software Real Time Colour Video Digitiser is now supplied with not just one, but two fully multitasking application programs! In fact the software supplied with each Digitiser comprises at least four different programs, (the number is increasing all the time). Included in these is the !Micci application which is probably the most user friendly of all video processing programs. (See photo).

HARDWARE

The Digitiser hardware consists of a double width podule which plugs straight into the back of a 300 or 400 series Archimedes. (Note that a podule backplane is required in 300 series computers).

For A3000 owners we supply a special inexpensive adapter box which contains the digitiser card and plugs into the back of the A3000 using a ribbon cable.

Inputs are provided for PAL composite video and also R,G,B. Manual adjustment of Contrast, Saturation and Brightness provide for ease of initial setting up.

SOFTWARE

The Heart of the Digitiser software is a relocatable module which contains all the video processing routines. All of the previously mentioned software applications access these routines in various ways. For the user who can write simple BASIC programs this module provides easy access to all of the Digitiser routines via '*' commands and SWI's

The new multitasking software makes life very easy for those who wish to incorporate images into Wordprocessing, Desktop publishing, or Art packages. The ease with which grabbed images can be 'zoomed in' and 'cropped' to the required size has to be seen to be believed, and when the required part of the image is selected, it is then a simple matter to 'drag' the image directly into another application.

As well as providing it's own powerful processing routines the Pineapple Digitiser can just as easily use software such as ChangeFSI or AIM to process it's images giving unrivaled versatility.

Also now available in the Multitasking software is a routine to allow capture of a sequence of frames. The number which can be stored depends on the amount of memory you have available (and the size of image chosen), and when grabbed the images can be stored to disc or transferred to PAINT for analysis.

EXCLUSIVE FEATURES

The Pineapple Software Real Time Colour Digitiser is the only one currently ilable with the following exclusive features:-

1. 16 bit operation (extended version) for smoother colour graduations.
2. Two independent multitasking applications plus other powerful software.
3. Digitising of the full video area normally displayed on a TV screen.
4. R,G,B inputs providing higher quality pictures from professional video equipment.

SPECIFICATION

Video Inputs	Pal coded video. 75 volts – 2.5 volts pk to pk. R,G,B, & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192k Ram Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256k Ram
Picture Area	The Digitiser hardware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.



ThePineapple Digitiser now has full multitasking software. This makes it quite possible to watch TV on your computer monitor while doing some desktop publishing! You can of course grab images and add them into your documents if required at any time.

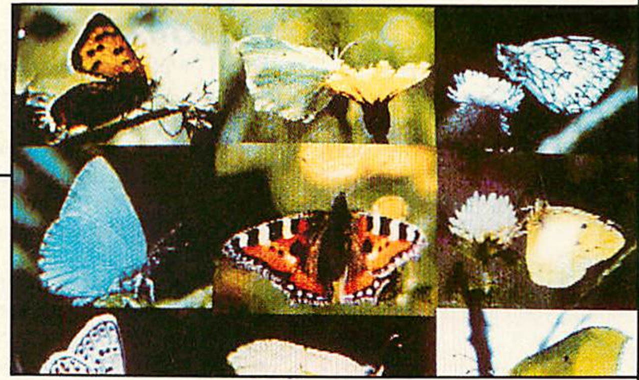
New from Pineapple is the PAL colour coder. This unit allows you to record your Archimedes screens onto a VHS video recorder by producing a PAL coded signal from the Archimedes R,G,B output. The R,G,B monitor can also still be fed from the coder unit.



!Digi Multitasking Application



!MICCI Application



Butterfly collection

PAL COLOUR CODER

A new hardware product now available from Pineapple is a high quality colour coder video unit. This unit produces a full colour coded video signal from the Archimedes computer which enables you to feed the output of the computer into a video recorder or second colour TV monitor.

FEATURES:-

1. External to computer – no podule slots required.
2. Complete sync pulse regeneration to provide the best possible signal for recording onto VHS recorders or displaying on TV monitors.
3. Switch selectable to 624 or 625 line operation – for interlaced or non-interlaced screen modes.
4. Plugs into R,G,B, computer socket and provides buffered output to feed Archimedes monitor, + coded signal output.
5. Adaptable for use with other computers or R,G,B, and Sync signal sources.

S/CHS Version £79.00

Price £69.00 + VAT p&p free

– 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –

– 'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes' –

Acorn User – April 90

Digitiser Prices

Standard	£285.00
Extended	£315.00
A3000 Adaptor Box	£65.00

POSTAGE AND PACKING FREE

NEW LOW PRICES!!! NEW LOW PRICES!!!

BBC PCB Designer

NEW LOW PRICES!!! NEW LOW PRICES!!!

This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input rountine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price. *Acorn User* – Aug 88

PRICE		
	EManual track routing	£55.00
	Auto track routing	£85.00
	Plotter Driver	£35.00

P&P free

Still available at new discounted price! DIAGRAM II £25.00 !!!

Marconi Tracker Balls

RB2/101	BBC 'B' & 'B+'	£45.00
	inc software	
RB2/101M	Master	£45.00
	inc Pointer Rom	
RB2/115	Archimdes	£45.00
RB2/110	Nimbus	£45.00

Replacement lead to convert 101 series to Archimdes. £12.50

Postage & Packing on Tracker Balls £ 1.75



Please add 15% VAT to all prices

39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL
Tel: 081-599 1476. Fax: 081-598 2343



WELCOME T

The BBC Acorn User Show takes place at the Wembley Conference Centre in London from

Calling all Acorn computer users – the biggest event in the Acorn calendar is about to happen and you can't afford to miss it!

The 1991 *BBC Acorn User* Show is due to take over London's Wembley Conference Centre from Friday October 11 to Sunday October 13. And it looks like being one of the best shows for some time, with hundreds of new products being launched.

The most important of these could be a brand new Acorn computer with an updated operating system (as exclusively previewed on page 7).

But this is very much a show for current Beeb and Archimedes users, so there will be a host of new hardware and software products for you to see. So whether you are interested in education, home computing, games or programming, you can't afford to miss this show.

Our special preview includes exhibitor information and floor plans. See you there!

SHOW ENTERTAINMENT

Acorn is organising a series of special presentations in the show theatre. These will be both entertaining and informative. Throughout each day four main themes of importance to micro users will be covered: leisure, creativity, working and education at home.

With the emphasis on entertainment as well as instruction, each one-hour presentation will include a variety of different software and hardware products, with helpful ideas and suggestions on how to make the most of your home computing. The presentations are free and will run between 10.30am and 5pm on each day of the show.

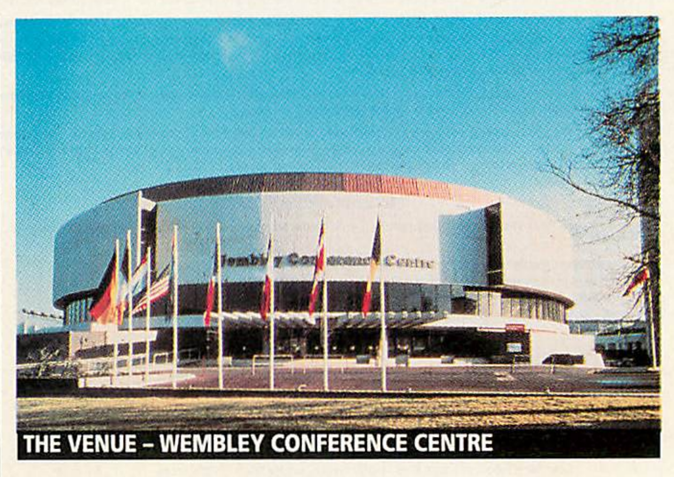
CLASSROOM PROJECTS

Of particular interest to our educational visitors – both teachers and pupils – will be a mock classroom area which will feature a range of activity and projects on various Acorn machines. There will be an opportunity to look at different items of hardware – software can be applied in 'real' classroom situations and experts will be on hand to give advice and answer queries.

FAMOUS FACES

A host of TV and sporting personalities will be appearing at this year's show. Popular TV presenter, Carol Vorderman, will there on Saturday and is expected to be particularly interested in the educational activity at the show.

Following last month's announcement of a sports sponsorship package, Acorn will be calling on such sporting personalities as Fatima Whitbread and Linford Christie to make personal appearances and meet visitors and exhibitors.



THE VENUE – WEMBLEY CONFERENCE CENTRE

HOW TO GET THERE

Tube: Take the Metropolitan Line or Jubilee Line to Wembley Park, or the Bakerloo Line to Wembley Central (the latter is open during peak hours only). A free shuttle bus service will be operating from Wembley Park underground station to the conference centre.

British Rail: By train from Euston or Broad Street to Wembley Central, or from Marylebone to Wembley Stadium.

Buses: 83, 92 and 182 to Wembley Arena, 18 to the Triangle (five minutes walk), 297 (alight at Wembley Park station) and 245 (alight at Bridge Road).

Road: Use the North Circular (A406) and follow the signs to the Wembley Complex. The car parks are operated by NCP and there is a charge of £6 per vehicle.



LEMMINGS – JUST ONE OF THE NEW GAMES AT THE SHOW

FUN AND GAMES

The *BBC Acorn User* Show will be the major launch pad for a whole new generation of games for Acorn computers, particularly the 32-bit Archimedes and A3000.

Rows of Acorn machines will be lined up and running the latest games and visitors will be able to wander through the arcade and try them all out at first hand.

Details of the latest games that you can expect to see at the show are in this month's Game Show (see page 151). *Lemmings* for the Archimedes (left) is just one of the highlights – there are plenty more!

O WEMBLEY

October 11 to 13. Here is our preview of the new Acorn products you can expect to see

ACORN TOWERS ABOVE

Acorn Computers will have a dominant presence at this year's show. You won't be able to miss the Acorn stand – A large Acorn 'tower' will rise above the stand, which takes up a large area right in the centre of the lower ground floor area.

If rumours of a new Acorn machine launch at the show are correct (see page 7), the stand will be buzzing with activity. Expect to see special consoles full of new machines which you can look at and try. Acorn is also promising other surprises, but the wraps are definitely on until the show opens.

Apart from the main stand, Acorn is also organising a host of activity, mainly in the features area on the ground floor. Key features include a show theatre, special workshop clinics, a games arcade (see separate items for details).

Acorn will be operating an on-site warehouse, in the shape of a large pantechnicon parked in front of the Wembley Conference Centre. Visitors will be able to take advantage of special show offers and collect equipment from the warehouse – watch out for further details at the show.

LOOK AND LEARN



Acorn is organising a series of workshop clinics which will be running on each day of the show. Manned by experts, the six clinic areas will feature:

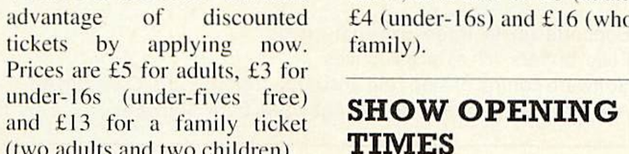
- First Steps – an introduction to the Archimedes/A3000
- Programming and development
- Eight-bit technology
- Networking and communications
- Acorn applications
- Education

The sessions will run continuously and in parallel between 10.30am and 4.30pm on each day. They will have an open-ended format, so visitors can feel free to ask questions at any time. There is limited seating in the clinic area. However, there are overhead monitors and a public address system so that those in the standing area can see and hear what is being explained in each clinic.

Entry is free to all sessions. Make sure you come along and see for yourself.

SAVE ON TICKETS

Visitors to the show can take advantage of discounted tickets by applying now. Prices are £5 for adults, £3 for under-16s (under-fives free) and £13 for a family ticket (two adults and two children).



Applications for advance tickets should be made to: Safesell Exhibitions Ltd, Market House, Cross Road, Tadworth, Surrey KT20 5SR. Tel: (0737) 814084.

Tickets are also available on the door on each day of the show, at a cost of £6 (adults), £4 (under-16s) and £16 (whole family).

SHOW OPENING TIMES

Friday October 11
10am to 6pm
Saturday October 12
10am to 6pm
Sunday October 13
10am to 5pm



COME TO OUR STAND TO SEE DTP IN ACTION

SEE DTP ON OUR STAND

With the ever increasing interest in desktop publishing, the *BBC Acorn User* team will be demonstrating how the magazine is produced using an Archimedes DTP setup.

A special editorial office will be set up in the features area and you can see how text is edited, how pages are laid out and how screen shots are imported into *BAU*'s editorial pages. The editorial team will be on hand to offer advice on all aspects of wordprocessing and DTP and you will be able to see the December edition of the magazine being produced 'live' at the show.

In addition to the DTP activity, the editorial team will be ready to offer you expert advice on all aspects of Acorn computing. You will also be able to buy the latest copy of the magazine and take full advantage of any special reader offers on subscriptions and other merchandise.

Next door to the *BAU* editorial office will be a supporting team of young newshounds, sponsored by ESM. The team of pupils from St Bede's School in Cambridge will be trawling the show for news snippets that will appear in a special show newsletter, which will be produced using ESM's *Desktop Folio* DTP package.


NEWSHOUNDS WILL BE ON THE TRAIL AT THE SHOW

MORLEY E·L·E·C·T·R·O·N·I·C·S · L·T·D



SPECIAL OFFER

0% Finance available.
We will try to match or better any advertised offer.

A3000	£599
410/1	£1099
420/1	£1299
440/1	£1699
540/1	£2995
The Learning Curve	£699
Arc. Learning Curve	£1299
A3000 Special Access	£679

CROSS-32 META-ASSEMBLER

Table driven macro cross-assembler supporting over 30 processors with the facility to add more.

Phone for data sheet. £175

MEMORY EXPANSION

A3000 1MB Expandable	£69
A3000 1MB Non-Exp.	£59
A3000 3MB Upgrade	£179
A3000 1MB to 3MB	£140
305 1/2MB	£69
400 Series 1MB	£50

ArcTools

Fully RISC OS compliant disc utility package. Various features including:

- Multiple file & directory manipulation (deleting, searching, setting access rights, file types etc.)
- System information (including computing index)
- File editor (both ASCII & hex)
- Disc editor (both ASCII & hex)

£19

CONTROL ON THE A3000

SPARKLE

Sparkle is a fully RISC OS compliant control package for the A3000 & Archimedes allowing full control of input, output and motor devices via most control boxes. Sparkle is a simple language which gives users full access to control boxes as well as the ability to use analogue equipment and simulate inputs & outputs in a variety of ways.
Data & frequency logging and counting & timing facilities are also provided as standard.

Sparkle	£59
Site Licence	£200

AnDi ODDULE

The AnDi Oddule is a low cost control box for the A3000 & Archimedes. There are 8 input/output connections, 4 analogue to digital inputs and 1 digital to analogue output. The box connects directly to an I²C connector (as on our Analogue & User Port interface) or can connect to a standard podule socket via an optional adaptor. The box can be controlled directly via RISC OS SWI calls or using Morley's Sparkle control software.

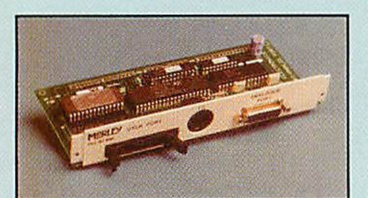
AnDi ODDULE	£49
Optional Adaptor	£8

ALFRED ROBOT ARM

The Alfred Robot Arm is designed to provide a low cost solution to the teaching of the principles of robotics in schools, colleges and industrial training departments. The system is structured to provide on-going education by introducing expansion modules, therefore always updating the system to meet new technology demands.

The complexity of exercises that can be carried out will benefit school children who are being introduced to robot technology or technical college students requiring an in-depth understanding of industrial robots.
£330

A3000 BBC ANALOGUE & USER PORT PODULE



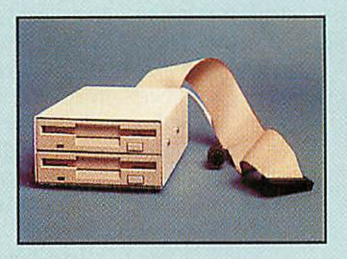
Full specification BBC analogue and user port. The analogue port is accessible using ADVAL from BASIC5 with all BBC OSbyte calls supported.

£59

As Supplied to Acorn for their A3000 Special Access Package

A3000 ADDITIONAL DRIVES

A3000 3.5" SECOND DRIVE



Easy to install – simply plug in and run.
High quality Japanese drive.
Incl. full fitting kit (with one drive) and instructions £125

A3000 5.25" SECOND DRIVE



Kit includes:
5.25" 40/80 track drive
Case
Power supply
Interface and leads £169

A3000 DISC BUFFER

Supports up to three external drives
Fully buffers all external drives
Software control of step rate and double stepping of 5.25" drives
Allows drive numbers to be changed from software £48

BBC / MASTER SCSI DRIVES

Completely compatible with BBC Bs, B+s and Masters fitted with ADFS. Free utility disc including Format, Verify, Archive and Park.

20MB incl. interface	£399
30MB incl. interface	£449
40MB incl. interface	£499

BBC / MASTER DISC DRIVES

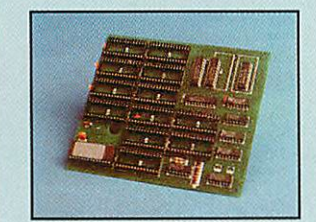
Single 40/80 switchable	£79
Dual 40/80 switchable	£169
Power Supply	£40

TELETEXT

BBC/Master	£104
Compact	£120
RML Nimbus	£104
Archimedes	£125
Optional PSU	£9.50
Upgrade from BBC to Archimedes	£35

BBC / Master EPROM Programmer £40

MASTER ROM EXPANSION BOARD



Allows an additional 8x16k and 4x32k ROMs to be installed in the Master and still leaves the cartridge slots free. £49

As well as manufacturing quality peripherals for over six years, Morley is an Acorn Dealer & Service Centre. This advertisement only covers a small range of the products we offer. If there is anything you want that you do not see advertised please phone for a competitive quote.

All prices exclude VAT & carriage

MORLEY HOUSE, WEST CHIRTON, NORTH SHIELDS, TYNE & WEAR, NE29 7TY. TEL (091) 257 6355. FAX (091) 257 6373

WHAT'S ON WHERE

Hundreds of products will be featured on the various stands at the show, many of them on show for the first time. We asked exhibitors for details and below is a selection of what you can expect to see. Exhibitors are listed in alphabetical order – for a stand-by-stand breakdown, see separate list.

Ace Computing (57) is launching *Einstein*, a complete design and animation package. This multi-dimensional editor is the first product to allow interactive manipulation of Bezier surfaces on the Archimedes.

Arxe Systems (67) is showing QuadFS, designed to replace the normal ADFS system for floppies. The product will comprise a card which will hold the new disc controller system and a 2Mb high density disc drive. Also shown will be *MultiFS* v2.00, *MacFS* (which allows the Archimedes to read/write to 1.4Mb Macintosh floppies) and a yet-to-be-named ray tracing package.

Beebug (31 and 33) has recently formed a new company called RISC Developments, whose first product is *DeskEdit*, a new multi-tasking editor for the Archimedes. Also on show will be the *Hearsay II* comms package, Spectra colour scanners, IDE hard disc drives and 4Mb RAM card for the Archimedes 310.

Clares Micro Supplies (29) will feature *Render Bender 2*, which is fully Risc OS compatible and includes a new graphics front end (like *Draw*) which allows scenes to be drawn then animated.

Computer Concepts (43) will be launching *ArtWorks*, a new graphics illustration package. Also expect other new hardware and software developments, as well as the usual free upgrade to the latest version of *Impression* – just bring your serial number.

Digital Services (11) will be showing *Squirrel*, the desktop database package for the Archimedes. New for the show are mailmerge links to *Impression* and *EasiWriter* wordprocessing software.

Electromusic Research (1) will be showing a new *StoryBook* program with easy scaling and animation. *SoundSynth II* is low cost sound sampler software, and new *Studio 24Plus* software offers unlimited tracks. An EMR MultiPort card for the A3000, new music discs and many special offers will also be featured.

Electronic Font Foundry (53) will be showing a range of fonts and keyboard drivers for languages ranging from Welsh to Bengali.

ESM (39) will be demonstrating the new *Desktop Folio* educational DTP package (see disc on this month's cover).

4Mation (61 and 65) will be showing *Chameleon*, a utility which allows the colours of objects in *Draw* and *Poster* files to changed at the click of a button. Also, *smArt* is a linked graphics system which allows a picture file to be changed from menu options. Updates of *Poster* and *Snippet* will also be available and demo discs are available in exchange for a blank disc at the show.

Ian Copestake Software (35) is showing *QuicKey*, which allows the function key strip to be shown on screen, linking to the application in use. Another new product, Whisper, reduces fan noise in the Archimedes 300/300 series machines by measuring temperature and changing speed accordingly. Other products in the Idea range will also be announced at the show.

Iota Software (45) will be launching a new Image range, including an Image Scan overhead colour scanner which is claimed to be nearly one-third the cost of the nearest alternative. *Image Display*, *Animator* and *Outliner* software support the scanner. *First Class* is an interactive software introductory guide to the desktop, Risc OS windows, and *Draw*, *Paint* and *Edit*. Also on show will be *Data Power*, the 'big brother' to Iota's *Junior Database* package.

Longman Logotron (103) is launching *PinPoint*, a new generation database enabling easy collection, analysis and presentation of information. *Revelation 2*, the updated version of the company's graphics package, will also be shown, plus *Notate*, a new music processor. A 20 percent discount will apply to all products bought or ordered at the show.

Minerva Software (49) will be showing *PrimeArt*, a new art package for primary and special needs use, in special classroom setups. *GraphBox Professional*, a new graphing package aimed at the scientific and business user, will also be featured.

Morley Electronics (48) will launch a new range of SCSI hard disc drives, which come complete with Morley's own SCSI interface. New control hardware, controlled using *Sparkle* software, will also be available.

PRES (71) is showing its podule expansion for the A3000 and *MicroTrader Business System*, the new fully Risc OS-compliant accounts package.

QD Enterprises (50) is launching new products under The Serial Port label. Featured will be a podule version of the Econet MIDI sampler interface, an Econet socket-based MIDI interface which will be fully software compatible with Acorn machines, a parallel port sampler, an updated version of *Arcterm 7* and a preview of a new assembler/debugger/compiler/editing suite of programs.

Sherston Software (91) will feature three new educational programs for the Archimedes/A3000. *HiLighter* allows graphics and text to be linked. *Recall* is a new database package designed for children to use and *Glimpse* works alongside DTP work and displays miniature versions of *Draw* and sprite files.

Spacetech (111) is launching a new weather satellite decoder program, as well as a new image processing package, *Satview*. Also, *Faxscan* is a new product which allows owners of an Amstrad fax to connect it to a computer and use it as a 200dpi scanner for DTP work.

Watford Electronics (37 and 41) is featuring a range of new products, including the first Arm 3 upgrade for the A3000, a new IDE interface card to bring PC hard disc advances to Archimedes users, and an infra-red cordless mouse.

Wild Vision (63) will be announcing new developments in its range of products for video manipulation, digitising and genlock, as well as data acquisition.

● **See the news pages (starting on page 7) for any last minute additions to the preview.**

STAND BY STAND

LOWER GROUND FLOOR

	Acorn Computers (centre)
1	Electromusic Research
3	Manor Court Supplies
5	Cambs Software House
7	Craddock Computer Sys.
9	Eterna
11	Digital Services
14	Micro-Aid
15	Orion Computers
17	The Fourth Dimension
21	" " "
19	Pineapple Software
23	Irlam Instruments
25	The KAD Consortium
27	" " "
29	Clares Micro Supplies
31	Beebug
33	"
35	Ian Copestake Software
37	Watford Electronics
41	" "
39	ESM
43	Computer Concepts
45	IOTA Software
47	Oak Solutions
48	Morley Electronics
49	Minerva Software
50	QD Enterprises
51	We Serve
53	Electronic Font Foundry
55	Lindis International
57	Ace Computing
59	Colton Software
61	4Mation
65	"
63	Wild Vision
67	Arxe Systems
69	Archimedes World
71	PRES
72	Krisalis Software
75	" "
73	Norwich Computer Serv.
74	Micro Studio
77	Paratex Archimedes Dev.
79	Videk
81	Caligraph
83	"
85	HS Software
87	CJE Micros
89	AVP
91	Sherston Software

GROUND FLOOR

	Features area including:
	BBC Acorn User stand
	Show Theatre
	Workshop clinics
	Games Arcade
	Mock classroom
93	Micropower Ltd
95	" " "
97	Icon Technology
102	Kendal Computer Centre
103	Longman Logotron
105	Topologika
107	Arvis Multimedia
111	Spacetech
113	The Data Store

Wimp Programmer's Toolkit

£19.95 *inc VAT*

Twelve powerful multi-tasking utilities - an essential aid to any programmer



- **Spyglass** - displays the contents of memory allocated to any task currently running.
- **Wimp Debugger** allows you to debug Wimp-based programs while testing and running them.
- **Template Editor** - the latest version of Acorn's FormEd for designing windows and icons.
- **Template File Browser** allows you to view the contents of a template file.
- **Application Shell Generator** utility for creating application directories, Obey files and their sprites.
- **Menu Editor** - create and edit Wimp menu structures for use in your own programs.
- **WimpAid** allows pointer, window and icon parameters to be dynamically displayed on screen.
- **Iconbar Shell Generator** allows you to build simple multi-tasking programs very easily, by creating a shell.
- **Desktop File Loader** allows you to load a program from the Desktop, rather than run it.
- **Icon Flag Generator** calculates the value of icon flags without recourse to binary arithmetic.
- **EasyWimp** provides a ready-made Wimp application shell to be used for creation of single-window applications.
- **Wimp Message Monitor** provides a means of monitoring the Wimp polling system.

A multi-tasking customisable magazine database

ArcScan III

£18.95 *inc VAT*

Contains the following Databases:

- RISC User Volumes 1, 2 and 3
- BEEBUG Volumes 1 - 9
- Index to RISC OS Programmer's Reference Manual
- Index to ANSI C Manual (Release 3)
- Index to BBC Basic Guide
- Index to RISC OS User Guide

ArcScan III features:

- flexible keyboard search on any entry
- dynamic memory management, returning unused memory to the Wimp
- dedicated ARM code routines enabling rapid information retrieval
- improved search logic - choice of 3 logical operators: OR, AND and NOT
- fast scrolling Wimp window displaying finds
- detailed manual and extensive on-screen help
- new extended wildcard option
- fully user customisable

ArcScan Library Disc

£9.95 *inc VAT*

Offers an index for Acorn User and Micro User magazines from January 1987 to date.

The Library Disc will be regularly updated to include the latest issues, and upgrades will be available for £4.45.

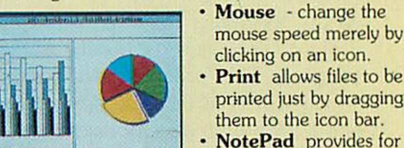
As a **Special Offer** you can purchase an ArcScan Library disc with vouchers for two upgrades for the price of £16.95 (inc VAT).

A selection of 12 multi-tasking

Desktop Applications

£14.90 *inc VAT*

- **DataSheet** - data presentation package for creating annotated graphs
- **Calc_570** - an implementation of a scientific calculator.
- **CharDes** - character designer for creating new system fonts.
- **Diary** - a Desktop diary and calendar.
- **B_to_T** allows Basic programs to be edited without leaving the Desktop.
- **FileFind** performs a hierarchical search for a given file, application or directory.
- **SetType** - change the filetype of any file by dragging it to the icon bar.
- **HotKeys** - allows single key presses to perform a wide range of functions.



- **Mouse** - change the mouse speed merely by clicking on an icon.
- **Print** allows files to be printed just by dragging them to the icon bar.
- **NotePad** provides for up to eight pages of jottings.
- **Dustbin** - sits on the icon bar and allows files to be deleted by simply dragging them to its icon.

Outstanding Value



7 Original Archimedes Games in

ArcOmnibus

£14.90 *inc VAT*



- **Amaze** - a graphically superb sliding block game with a difference.
- **Cribbage** - an excellent implementation of the well known card game.
- **Moric** - a colourful 'ladders and levels' game.
- **Ogre's Lair** - a highly entertaining arcade type game, providing hours of fun.
- **Pick a Pair** - a colourful game testing your skills of observation and memory.
- **BalloonMan** - burst the balloon - a Pacman style of game.
- **Dominoes** - a Desktop version of the classic game of dominoes.



File Handling for All

by David Spencer and Mike Williams

£9.95

File Handling for All is a comprehensive book which covers all the requirements of data storage and processing by computer, using the popular BBC Basic programming language for the examples. It is aimed at anybody interested in File Handling and Databases, whether beginners or more advanced users, and will appeal to all who want to learn more of this important subject.

The book starts with an introduction to the rudiments of file handling, and in the following chapters develops an in-depth look at the different types of files e.g. serial files, indexed files, direct access files, and searching and sorting. A separate chapter is devoted to hierarchical and relational database design, and the book concludes with practical advice on developing file handling programs.

The associated disc (£4.75) contains complete working programs based on the routines described in the book and a copy of Filer, a full-feature Database program.

£14.90 *inc VAT*

Desktop PC Disc Reader, Background Text Printer, 3 Exciting Outline Fonts in

mArc Three Disc

plus:



- **Sticky BackDrop** - places icons anywhere on the desktop
- **Application Shell Generator** for creating application directories, sprites and !Run files.
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POWER AND SIMPLICITY
Genesis Plus
GIVES YOU THE BEST OF BOTH WORLDS

Genesis Plus gives you the ability to use all of the features of Genesis II, but with a simpler user interface. Genesis Plus can be used to create powerful applications and can run any application created using Genesis II, but it remains simple to use by hiding the more esoteric features of Genesis II like the script language.

SIMPLE

Simple menus and dialogue boxes – ideal for use in Primary Schools

SOUND

Capture and play sound samples using the Oak Recorder microphone

VERSATILE

Works with CD ROMs, IV players, Concept Keyboard, Touch Screens

COMPACT

Compact code with speed critical routines hand coded in assembler– ideal for use on 1Mb machines

DTP

Multiple text styles, formats and colours within a single text frame

COMPRESSED

Compressed data – fit more information an a single disc, average 3:1 compression ratio

CONTROL

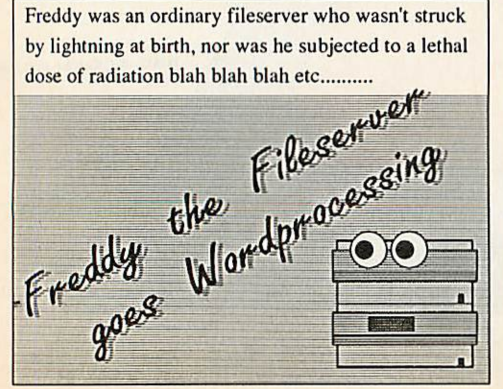
Can cope with single and double–clicks to activate links to other pages

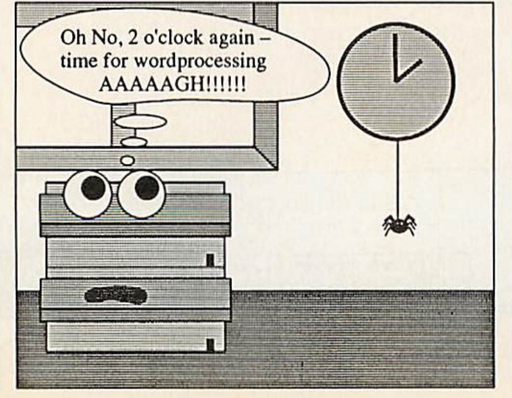
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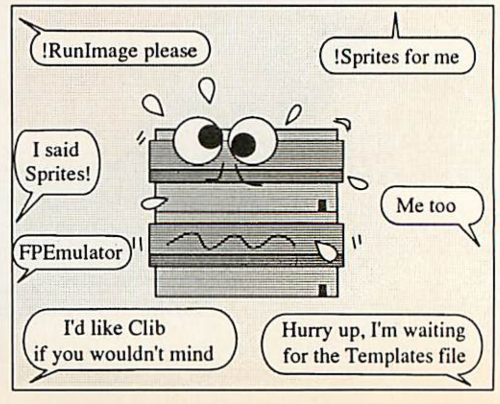
The Genesis family is the most popular and most widely supported range of multi–media software on the Archimedes

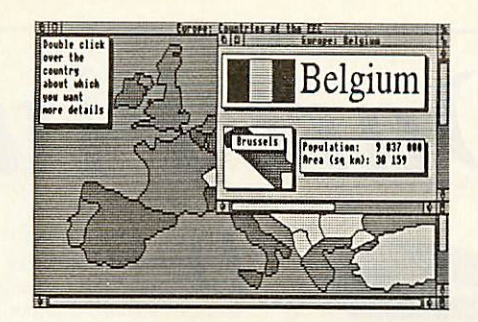
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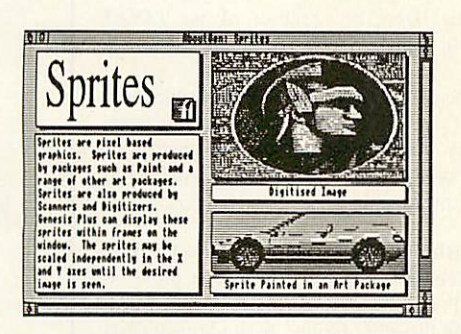
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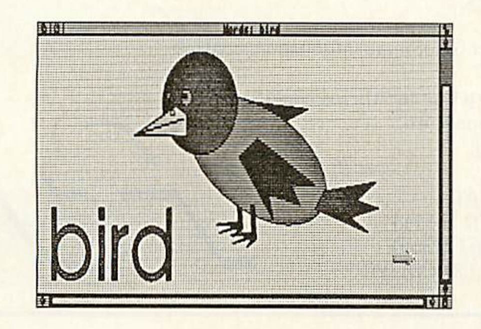


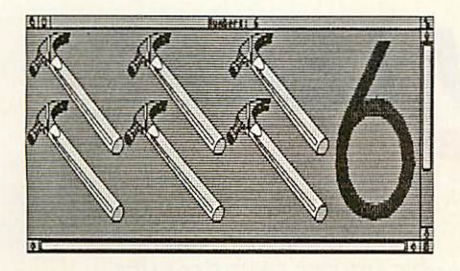








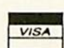




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NETWORK PRINTING TO LASER DIRECT

Now, at last, it is possible to use Computer Concepts' Laser Direct printers across Econet. Our new ClassPrintLD software package allows the Laser Direct printer to be accessed via any Archimedes on the network by providing a new printer driver for each machine. All print requests are then sent via the network, rather than directly to the printer. The machine connected to the printer runs a printer spooler which receives the data from each machine, stores it locally, and then prints it in the background, when the printer is free. The big difference between this and conventional network printing techniques is that the printer driver compresses the information before sending it over the network. For a typical DTP page (such as this advertisement) compression ratios of 8 to 1 can be achieved. Messages such as 'Paper tray empty' and 'Toner out' are sent back to each user across the network.

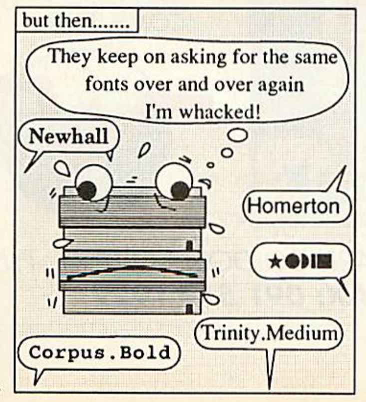
ClassPrintLD network licence £75.00 (Available Sept 1991)

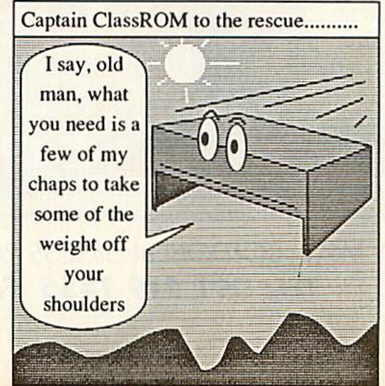
HARD DISC & NETWORK BACKUP

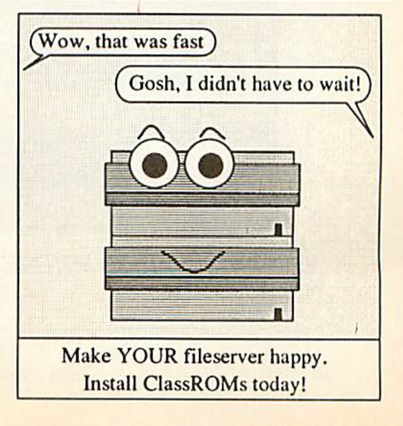
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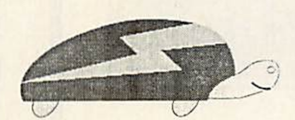
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Dart Plus

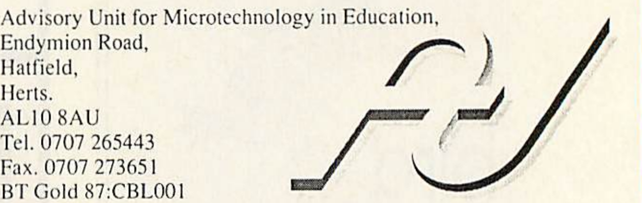


Dart is a computer language. Using this language you can learn to control the computer so that it draws pictures for you. It will be possible to draw some very pleasing pictures. *Dart* is a subset of the LOGO programming language used in many schools.

The new version includes nine extra commands which, together with the existing commands, meet the National Curriculum requirements in Mathematics, Technology and English. The new commands include SETPOS to specify an absolute position and HEADING to specify the direction as a compass bearing.

Dart is available for the BBC B/Master and Archimedes/BBC A3000 computers and will control a Jessop floor turtle provided your computer has a User Port. The BBC B/Master version also supports the Valiant turtle and the BBC Buggy. A site licence costs only £25.

To order or for more information, contact:



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LOOK BEFORE YOU LEAP!

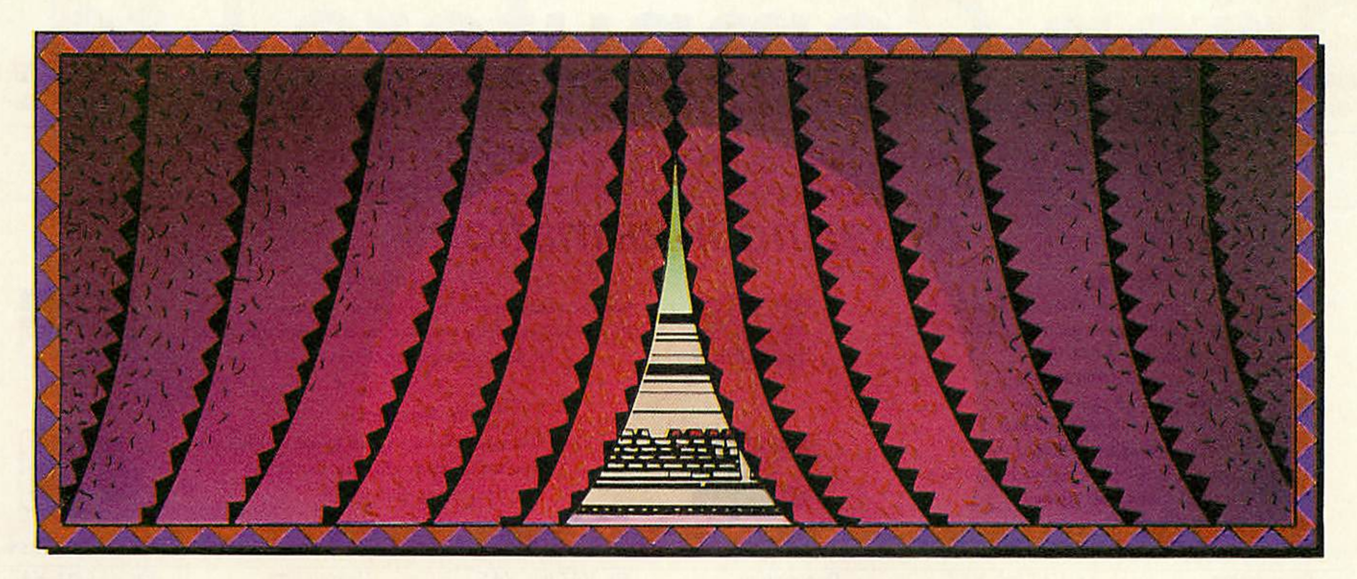
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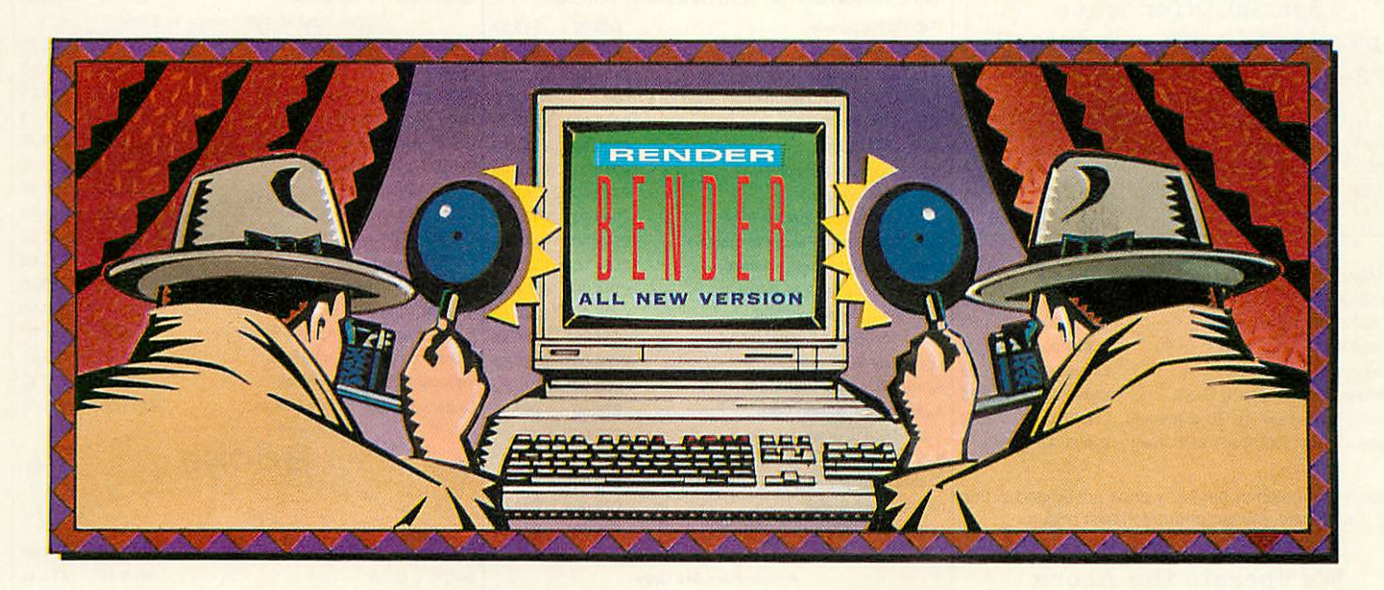
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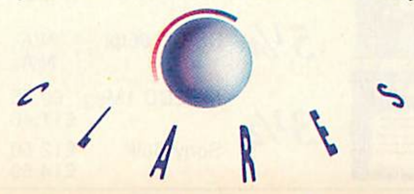


For more information please write to the address below for a Render Bender fact pack. We're sure you'll find it quite illuminating.

Price – *£135.00 inc. Vat.*

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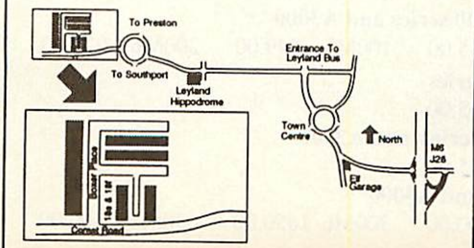
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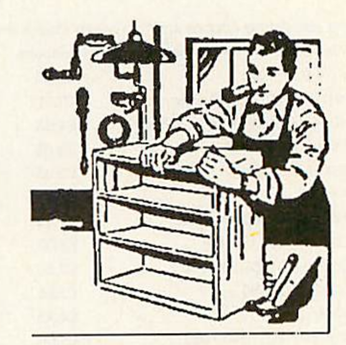
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★INFO

DAVE ACTON and **DAVE LAWRENCE** deliver their monthly mix of bits and pieces for your eight and 32-bit machines

COMPATIBILITY KEY

- B — BBC B compatible
- B+ — BBC B+ compatible
- M — Master compatible
- C — Master Compact compatible
- E — Electron compatible
- A — Archimedes compatible
- BBC A3000 compatible



THE MISSING LINK

B B+ M C E A

This month's star prize of £50 goes to **David Williams** of Loughborough for his ingenious *Links* program. It looks a bit like **David Walter's** molecule (from Risc Revue, May 1991), behaves a bit like the *String Thing* (May 1991 again) and would make an excellent basis for a game!

Links allows you to create structures consisting of points and links. Points can either be fixed (anchors) or free moving (floaters). Any point can be connected to any other point by a link of any 'tautness'. The tauter a connection is, the more stiff it becomes. A link with a tautness of zero will behave just as if the points are not connected.

Once a structure has been created (we'll go into this later), *Links* will simulate what would happen if this structure was dropped. Gravity will affect all the points individually, although their movement will, of course, be greatly influenced by what other points they are connected to and how taut the various links are. If too much strain is put on a particular link in the structure it will snap.

Links with high tautness are less likely to stretch but are more likely to snap. When the simulator is running, you can vary the force of gravity with the up and down cursor keys, with the current value being shown at the top of the screen. Values of zero or less are perfectly valid and will produce the obvious effects.

The first point in the structure is a little special. It behaves in exactly the same way as all the other points except that it can be controlled to a certain extent by the mouse, which is why it looks like an *Asteroids* ship! It can be rotated by moving left and right and accelerated by pressing any mouse button.

By default, points will bounce off the bottom of the screen, pressing B will disable this and instead, they come to rest abruptly. Pressing S will disable snapping. This means that no matter how much stress is applied to a link, it will never break.

If you lose your ship off the side of the screen from excessive acceleration, R will bring it back on the screen along with any points connected to it. The ESC key can be used to return to edit mode. Here you can edit the structure or retrieve the original configuration by pressing R.

You can create or edit structures with the mouse. Floaters, shown as green points, can be added with the left mouse button, Anchors, shown as red points, with the right. Links are made by pointing to a point, holding down the middle button and 'rubber-banding' a link to another point. Both ends of the link will automatically attach themselves to the centres of the relevant points.

When links are added they are given a tautness (shown at the top of the screen). This value can be altered with the left and right cursor keys. The up and down keys are still used to vary the force of gravity, the B and S keys still control bouncing and snapping. To delete a point, hold down either SHIFT and click on the unwanted point with the left or right mouse buttons.

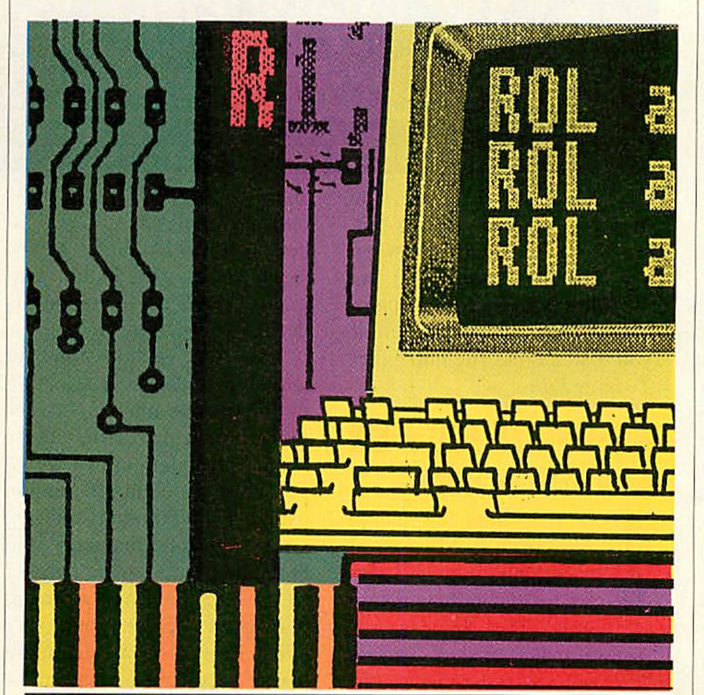


ILLUSTRATION BY ANDY LOVELL

★INFO COMPATIBILITY TABLE

LISTING	NAME	BBC B	MASTER	ELECTRON	ARC
Info 1	Links				★
Info 2	MakeDemo				★
Info 3	Frond8	★	★	★	
Info 4	Frond32				★
Info 5	Gobble32				★
Info 6	MakeGobSpr	★	★	★	
Info 7	GobSrc8	★	★	★	
Info 8	Gobble8	★	★	★	
Info 9	Fragger	★	★		
Info 10	WAISource			★	
Info 11	Mond1	★	★	★	★
Info 12	ToOneLine	★	★	★	
Info 13	Scroll1				★
Info 14	Scroll2				★
Info 15	Scroll3				★
Info 16	Scroll4				★
Info 17	Pendulum				★

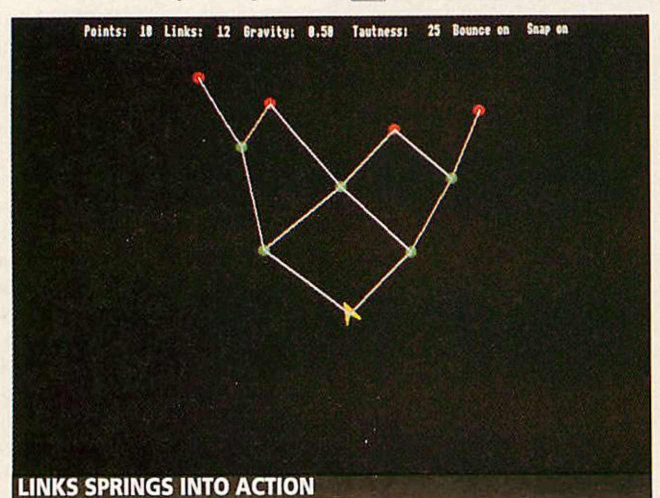


To remove a link hold down either shift key, point to a point and then hold down the middle mouse button. If you now move the pointer over a point to which the original point was connected, the link will flash. If you release the mouse button at this time, the link will be removed. Releasing the button when no link is flashing will simply return you to edit mode. Structures can be saved by pressing F3 (the Risc OS standard). This will prompt you for a filename – a default is given by pressing RETURN.

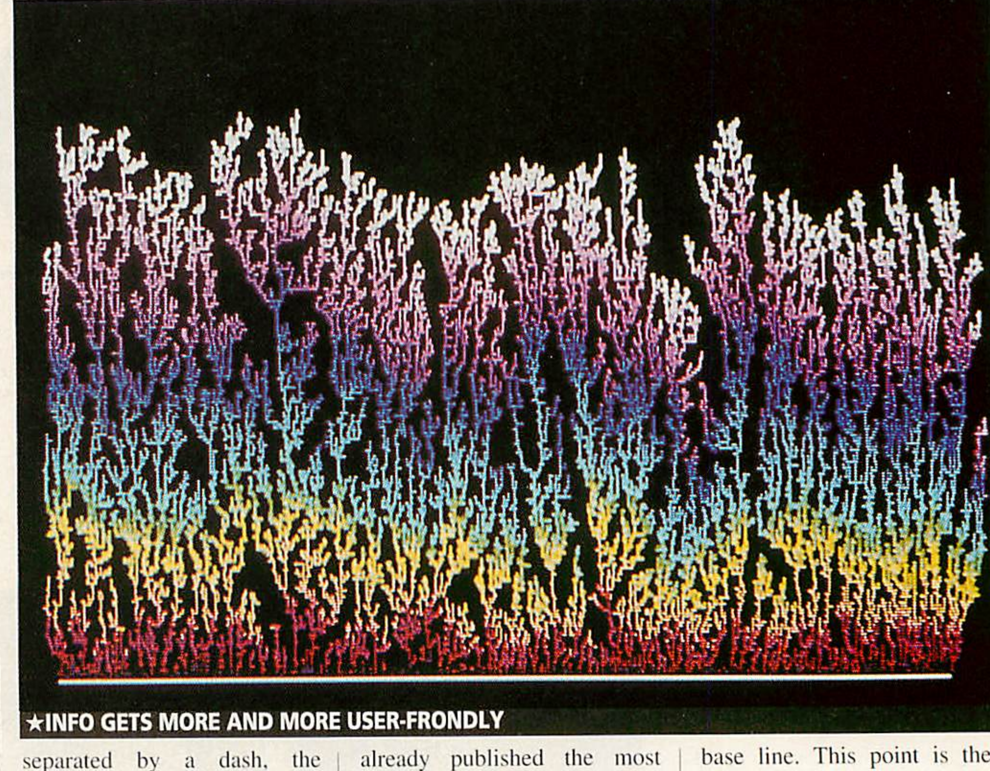
If you pressed F3 by mistake, ESC will return you to edit mode. To reload a file, press F2 and enter the filename. The values of gravity, tautness and so on are stored in the file as well as the co-ordinates of all the points and links. The only other keys you need to know about are SPACE, which starts the actual simulation and ESC which quits the program.

To give you a taste of the program, we have produced a demonstration file. If you type in and run MakeDemo, it will create a file called DemoStruct which can be loaded into *Links*. A textual file format has been used so that the files can be easily examined with an editor or even created by a separate program.

The file consists of a fairly self-explanatory header followed by a list of points and a list of links. Each point has an *x* and *y* co-ordinate, *x* and *y* velocities and a type (either 'Anchor' or 'Floater'). Links are defined as a pair of points separated by a dash, the 'normal' length of the link (i.e. how long it should be when not stretched or squashed) and its tautness. All of these parameters can be easily seen if you load a *Links* file into either *Twin* or *Edit*.



LINKS SPRINGS INTO ACTION



★INFO GETS MORE AND MORE USER-FRONDLY

★PRIZE £20★

A FROND IN NEED...

Our next item this month comes from **B. Moseley** of Didcot and continues with our long-standing nature theme. The program was originally called *Diffuse* and, according to Mr. Moseley, drew fractal ferns. Since we have already published the most fern-like fern you're likely to get (*Info, August 1991), we've rechristened the program *Frond*, as its output is decidely more frond-ly!

The Arc version runs in mode 15 and uses a selection of colours that make up a very vivid spectrum. BBC users needn't feel left out – we've produced an eight-bit version called *Frond8*. Run this on your eight-bit machine and enter the desired mode number (0, 1 or 2). A frondly picture will grow before your very eyes, albeit at a slightly more sedate pace than *Frond32*. We hope you'll agree that the results are worth it though – mode 0 pictures have a very delicate structure and are perhaps the most pleasing.

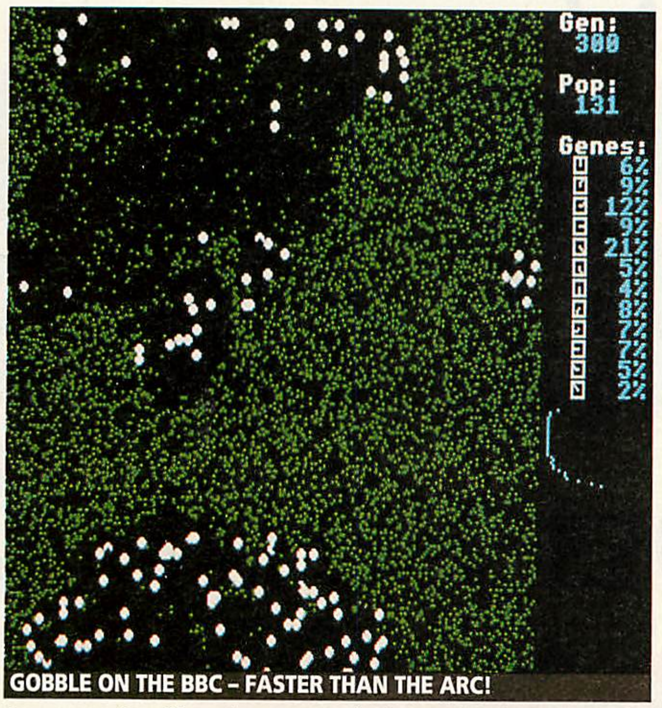
According to Mr. Moseley, the program uses a DLAA or 'diffusion limited aggregation algorithm' for long. I freely admit that I have no idea whatsoever as to what this means, but it does produce some very nice results! The fronds grow upwards from a line at the bottom of the screen. The Arc version has a facility for altering this line with the mouse and the Select and Adjust buttons. The algorithm works by picking a random point on the screen a little way above the base line. This point is then randomly moved downwards until it hits a point already plotted on the screen. The colour used to plot each point is 'increased' every now and again as is the height above the base line from which the points are dropped. The program uses a table of pre-calculated random numbers for more speed.

Frond8 works in an almost identical way to its 32-bit counterpart. For example, a random number table is used for speed (although it is 256 bytes long rather than 1024). Although the 8-bit and 32-bit plotting routines are markedly different because of the different ways the screens are laid out, pixels are 'dropped' randomly in the same fashion.

You might like to enhance *Frond8*. The picture is currently built up from a single line drawn by PROCdrawbase but you might like to allow the user to draw a pattern or plot a number of random dots. You might also like to save your finished screen. To do so add a line like:

```
*SAVE picture 3000 +5000
```

after the PROCgrow and before the END. Note that second processors and shadow memory should not be used since *Frond8* pokes directly on to



GOBBLE ON THE BBC – FASTER THAN THE ARC!

the screen. It will work on an Arc using *!65Host*.

If you've still got your velcro and flippers handy from last month you'll know what to do with them... Alternatively, David Bellamy fans may like to glue some polystyrene packing quavers to their chins and go wummaging awound in the undergwoaf...

★PRIZE £20★

IN-GENE-IOUS

We return to the popular theme of evolution for this next offering from **A H Lancashire**. Like **T K Boyd** who produced the *Gobble* program in June's issue (page 72) Mr Lancashire also read with interest the piece in *Scientific American* on the subject. His own version – *Gobble32* – is an alternative and equally fascinating demonstration of the evolutionary process.

The program simulates what happens to successive generations of a population of 'bugs' shown as little yellow squares on the screen. These eat 'grass' which grows at a constant rate and move about the field according to their own set of genetic rules.

How likely a bug is to move in a particular direction (or more precisely, turn by a particular angle) depends on the value of a particular gene. Initially gene values are evenly distributed and so the bugs move around haphazardly. This isn't particularly effective, however. Once a bug or its pals have eaten all the available food in an area, it will soon die if it doesn't move on to pastures new! Fortunately the evolutionary process comes to the rescue.

Strong bugs are capable of reproducing (they blush red when they do so). They split to form two new bugs and the strength of the parent is shared between the two offspring. Genetic mutation also occurs. Generally one gene becomes weaker and another stronger, so the children will move in a slightly different fashion from the parent. Darwin predicted that 'bad' genes would die out whereas 'good' ones would thrive. After only a few hundred generations this theory is ably demonstrated by *Gobble32*.

Although it seems that several gene combinations can produce healthy and stable populations, those genes that encourage forward movement invariably become most common and those encouraging backward movement virtually die out. This makes sense in that there is little point in a bug moving backwards since it will have already eaten all the grass there!

Gobble32 displays a bar chart showing the total incidence of each gene type and also a graph of the bug population as it changes over time. If the bugs survive the unpredictable first few generations – they sometimes don't, in which case the program simply starts again – the population invariably rises and falls quite dramatically and finally settles down to a stable range for the current food supply.

As it stands, *Gobble32* has similar bug types to the original *Gobble* from June's issue. Each bug can move in six directions: forward, forward left, forward right, backward left, backward right and backward. You can enhance the program by changing g% at the start to 12. Each bug can then move in 12 directions and there are 12 rather than six genes for each bug to determine where it will tend to go.

The array gene%() is used to stored the genetic details of each bug. If you're interested in how the program works, table 1 shows the contents of gene%() for a typical bug 'b'. When it is time for a bug to move, a random number falling between 1 and 100 (T%) is chosen and then the values for each gene that are stored in gene%() are added together in turn until the total is greater than or equal to T%. The gene that took the total to T% is the one that now decides the bug's new direction.

8-BIT GOBBLING

The original *Gobble* program could be adapted quite easily to run on eight-bit machines. However, keeping track of all the bugs takes more than a little time and on a Beeb or Master it might well take several seconds for each generation! As is often the case, the solution is to use machine-code and *Gobble8* is the zippy eight-bit result.

In fact there are three listings. First enter and run MakeGobSpr which creates two data files – GobSpr and GobMask – which are used by the main program to plot the bugs. Next run GobSrc8 which assembles and saves GobCode. This contains the main feeding and movement routines. Finally run *Gobble8* which will load GobCode and display the evolutionary process. Incidentally, PAGE should be set no higher than &1200 when running *Gobble8* and shadow screen memory (if available) should not be used since the screen is accessed directly.

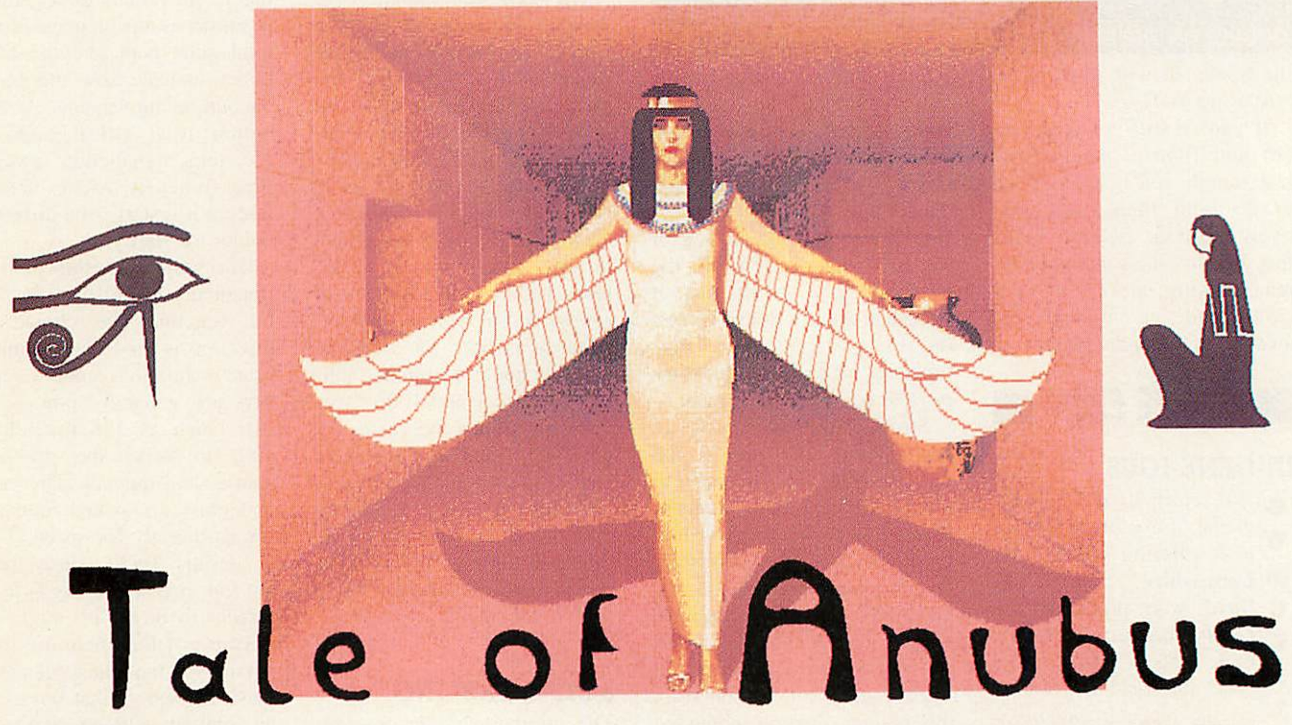
The eight-bit 'world' is a little different from the 32-bit one in that it is a 256×256 pixel square. Down the right are displayed various facts and figures about the developing population. At the top is the current generation number and below it the current population. Under this is a table of the 12 movement genes. Each is shown as a percentage of the total gene pool and the little boxes indicate how the genes encourage movement. At the bottom is a vertical graph of the total population against time. When it reaches screen bottom it restarts in a different colour for clarity.

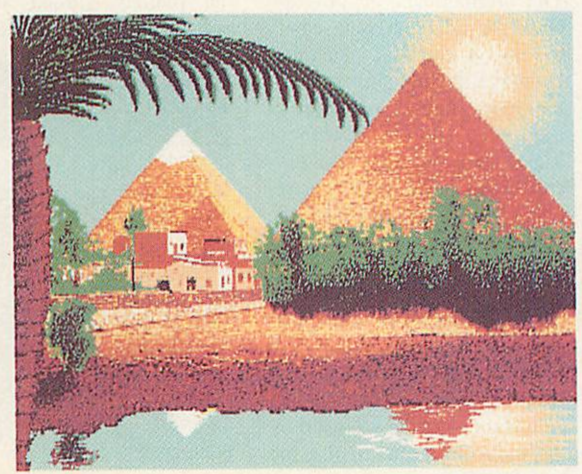
The basic algorithm used is practically identical to the 32-bit version. The choice of direction is made by a similar process although random numbers are generally powers of two (such as 128 instead of 100) to make the program shorter and quicker. The bugs and grass are poked onto the screen directly for speed. This is slightly fiddly since there are four pixels to every byte of screen memory in mode 1. Because of this there are four versions of the bug sprite and a mask is used so that bugs can be plotted without affecting adjacent pixels unnecessarily.

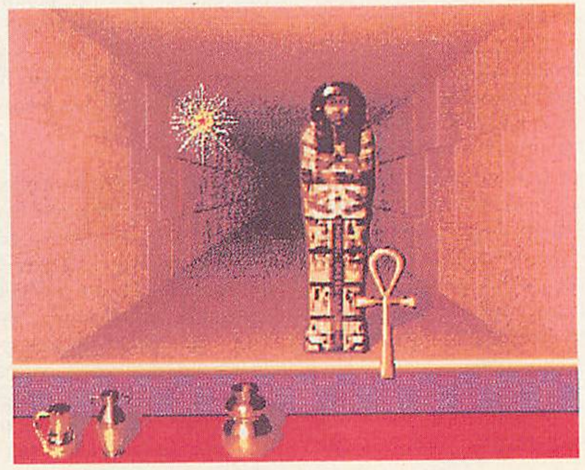
GOBBLE 32'S GENE TABLE

gene%(b,0) bug's strength
gene%(b,1) value of gene 1
gene%(b,g%) value of gene g%
gene%(b,g%+1) direction of last move
gene%(b,g%+2) x co-ordinate
gene%(b,g%+3) y co-ordinate
gene%(b,g%+4) 'fitness' of bug (energy used in a move)

Coming to an Archimedes near you soon !







Actual screen shots. Full parallax and 3D movement.

The machine-code routines clearly require their own random number generator (.rand) and this is 'seeded' with the value in TIME in order to randomise the complex process of machine evolution.

★PRIZE £20★

MAP READING

B B* M C E A **Richard Browning** of Somerset supplies this next item which will provide all eight-bit ADFS users with a graphic account of their discs' contents.

Unlike DFS which has only a very limited means of managing the free space on a disc, ADFS maintains a free space map. This contains the position and size of free areas on the disc.

Richard's program *Fragger* reads the free space map of an ADFS disc (old formats only – not Arc D or E formats) and displays the free areas. The program uses mode 7 and incorporates a special pixel plotting routine which, you may find, is a useful little program in itself.

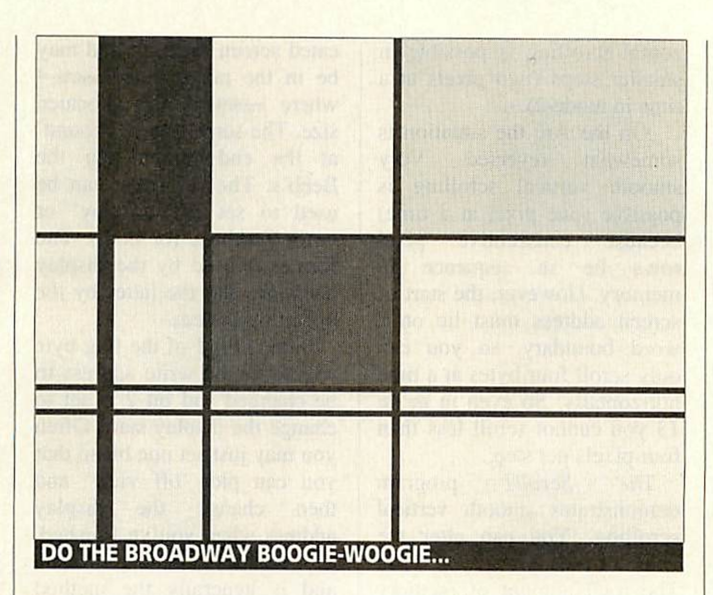
Also shown is how fragmented the free space is. This is given as a percentage. A disc with no fragmentation cannot be further compacted with *COMPACT since all the free space is in one block. A disc with 100 percent fragmentation, not unreasonably, has a full free space map.

Any operation (such as the deletion of a file) that would cause an extra hole to appear in the disc would lead to an error. In this case the disc must be compacted first.

The free space map is stored in the first two sectors of the disc (that is, the first 512 bytes). Table 2 contains a summary of the contents of these sectors. *Fragger* simply reads these sectors, plots the areas of free space found and produces the percentage fragmentation by a simple calculation.

The maximum number of holes permitted on an S, M or L format disc is 82 and the current number can be found by dividing the pointer to the end of the free space list by three (disc addresses are all three bytes long in the map).

If there are more than 20 fragments of free space you are asked if you want to compact the disc. Press Y and the program will *COMPACT the disc and restart.



DO THE BROADWAY BOOGIE-WOOGIE...

ADFS DISC SECTORS 0 AND 1

Bytes	Contents
0-2	Position of first hole
3-6	Position of second hole
243-245	Position of 82nd hole
246-251	Reserved
252-254	Total sectors on discs
255	Sector 0 checksum
256-258	Size of first hole
259-261	Size of second hole
499-501	Size of 82nd hole
502-506	Reserved
507-508	Disc identifier
509	Boot option (*opt 4)
510	Pointer to end of free space list
511	Sector 1 checksum

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DE PROFUNDIS

B B* M C E A The hierarchical nature of ADFS leads to sensible groupings of files and can encourage good disc management. Novices, unfortunately, can sometimes have great difficulty getting to grips with it, often resulting in huge gangly directory trees. With such a structure it is quite easy to get 'lost' down some particularly obscure branch of the tree and have no idea where you are at all.

BAU has published a couple of utilities that print your current pathname but they have all been for the Archimedes. For example, the *EveryWhere command from a few months back needed to find your pathname so it could return there after execution. As there is no official OS call to do this for you, the usual strategy is to repeatedly execute a *Dir ^ command reading each directory name (with OSGBPB 6) until the directory is $. At this point the root directory has been reached so the pathname can be printed and also passed to the *Dir command to return to the original directory. Although completely legal, this process can be quite slow and can't really be used by any other OS calls as it itself uses an OS call. It would be really nice to be able to set up a code variable on the Archimedes that always contained the current pathname.

This is possible, although not generally useful as you can hardly ever use the variable in a filing system call such as *CAT as OSGBPB is not re-entrant and your machine hangs... Anyway, back to the point! **A G L Spruit** of Holland has sent us a slight variation on this theme that works on Electron ADFS. *WAIsource* assembles a small piece of code called *WhereAmI*. This should be placed in your library and run simply by typing *WhereAmI, which will display your full current pathname. The code uses the same principle for finding the pathname as outlined above but instead of 'manually' stepping up the directory tree until the root is reached, it reads the current directory name from the ADFS workspace in page &1C. This also contains a disc address of the parent of this directory. This sector is read into memory, its name noted, and its parent's address found. As before, this process continues until $ is reached.

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MODERN ART

B B* M C E A As you may have noticed, we at *Info are very fond of one-liners. We've carried strings, molecules, wiggles and jiggles to name but a few.

Duncan Lilly debued in September with his charmingly restful *EyeStrain-er*. His latest offering is a welcome departure from this tortuous mind bender and the results would be much more at home on the walls of the Tate! According to Duncan, *Mond1* was inspired by a recent edition of BBC-2's *The Late Show* which had a feature about modern art. The program creates pictures in the style of the Dutch painter Piet Mondrian. Unfortunately, as Duncan rightly says, we rather doubt if the print-outs from the program would fetch quite as much as the originals!

To tell you the truth, the program didn't originally fit on one line, but due to the wonders of modern technology, we've managed to squeeze it in. Arc users should use the Basic Editor to enter the line. BBC people will have to cheat and enter each statement on a separate line and use the function key conversion routine first published on last month's puzzle page. (This has been reprinted on the yellow pages in case you missed last month's issue). To use this, run *ToOneLine*. This will set up function key 0. Load the program to be squashed and press F0. This will convert the program into a function key –



F0 again. Now type NEW and press 1 – meaning a line number – and F0. You now have a one-line program which can be saved in the usual way.

★HELP★

MAGICAL SCROLL

T Carsell has asked us about hardware scrolling on the Archimedes. This is a technique often useful in games where speed is of the essence.

The screen of the Archimedes is arranged rather differently from that of the Beeb and this is reflected in what can and can't be done in terms of hardware scrolling.

Like the Beeb the Arc has a 'start of screen address' and changing this (generally using an OS_Word call) allows the screen to be scrolled instantly. The Beeb's screen is arranged in character rows which means that only 'chunky' scrolling is possible vertically (eight pixels at a time) whereas horizontal scrolling is possible in smaller steps (two pixels at a time in mode 2).

On the Arc the situation is somewhat reversed. Very smooth vertical scrolling is possible (one pixel at a time) because consecutive pixel rows lie in sequence in memory. However, the start of screen address must lie on a word boundary, so you can only scroll four bytes at a time horizontally. So even in mode 13 you cannot scroll less than four pixels per step.

The Scroll1 program demonstrates smooth vertical scrolling. You can alter the value of testmode% as you wish. The total amount of memory allocated to the screen can be read using OS_ReadDynamicArea.

This will be the same as the amount shown in the task window. From this is calculated the number of full text rows that can fit in screen memory. To set the screen start address OS_Word 22 is used. This takes a parameter block containing a flag byte and an offset. The offset is from the start of allocated screen memory and may be in the range 0 to mem%-4 where mem% is the allocated size. The screen 'wraps round' at the end rather like the Beeb's. The flag byte can be used to set the 'display' or 'write' address (or both). The former is used by the display hardware and the latter by the operating system.

Setting bit 1 of the flag byte will force the write address to be changed and bit 2 is set to change the display start. Often you may just set one bit so that you can plot 'off view' and then change the display address when you've finished. This enables smooth animation and is generally the method employed when two screen banks are used: display bank A and write to bank B then display B and write to A. A vertical scrolling game might also write 'off screen' – plotting the next line of a landscape and then scrolling it onto the screen ready-drawn.

Horizontal hardware scrolling is trickier. *Scroll2* serves to illustrate the limitations of the Arc. It draws a *Rocket Raid* style cavern and scrolls it, rather badly, from right to left! Admittedly the fact that Basic is used to plot the caves is responsible for the jerkiness, but the fact remains that the minimum scroll rate of 4 pixels per frame seriously limits the usefulness of sideways hardware scrolling.

Fortunately the Arc's speed allows software scrolling to become a real possibility and this gives the user much more control in the end (for example, you can scroll just a part of the screen). In Basic some reasonable results can be achieved and *Scroll3* illustrates this by using a RECTANGLE TO command to move through the caves. If you have an Arm3 this program will run at the full 50 frames a second.

It only takes a small piece of machine-code to enable Arm2 machines perform smooth software scrolling. *Scroll4* contains the relevant code. Multiple load and store instructions (LDM and STM) are used together with some shift-

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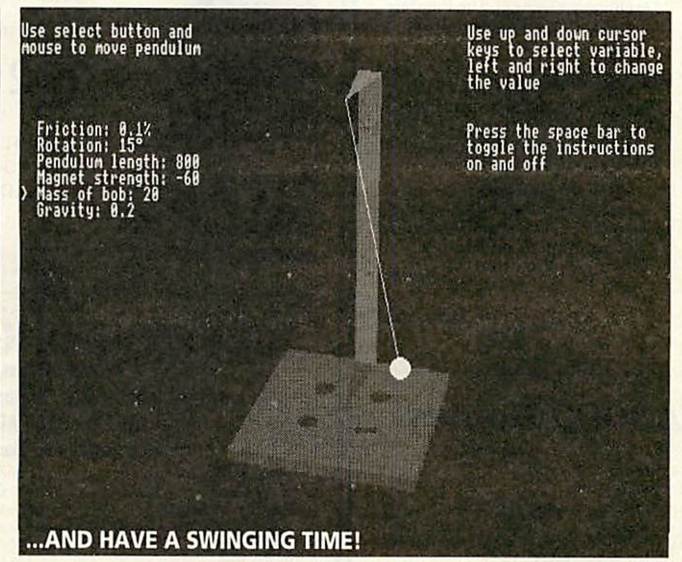
ing and logical ORring to move the screen left by one pixel. *Scroll4* runs at 50 frames per second when scrolling a mode 9 screen. It is possible to scroll a mode 13 screen in a single frame too provided that not much else is going on at the same time.

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PENDULUM

Michael Attenborough's *Pendulum* program is a simulation of one of those executive toys consisting of four magnets and a ball bearing suspended on a piece of wire. Using Select and the mouse you can 'grab hold' of the ball, move it somewhere and let it go. The program will simulate the gravitational and magnetic forces that dictate the movement of the ball.

A number of parameters can be altered (with the cursor keys) while the program is running, the purpose of these should become apparent if you try fiddling with any of them! Full instructions are provided on-screen. If these become distracting pressing SPACE will toggle them on and off.



...AND HAVE A SWINGING TIME!

Unfortunately there is no eight-bit version of *Pendulum* – we didn't feel up to coding all the floating point arithmetic into 6502 code! Don't let this stop you though – we would be delighted to publish eight-bit versions of any of the 32-bit programs that we carry. We've published BBC versions of *Wavy Scroll*, *3D Lissajous*, *Coral* and *Atoms*, so we're sure just about anything must be possible!

*QUIT

David Williams did it very well; Michael Attenborough is still doing it; Duncan Lilly's done it again (and he's only 17!); Mr Carsell wasn't sure how to do it - but we showed him how. A G L Spruit proved they do it in Holland! So how about you? No matter how big or small, serious or silly, pretty or functional, we are always interested in what you can do. Applications, graphical ditties, games, hints, tips, queries and suggestions are all equally well received. The *BAU* money fairy is very generous and will issue drinking tokens of various denominations to the authors of the best programs received.

SUBMISSIONS

Please send your submissions to us at: *Info, BBC Acorn User, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. All but the shortest of programs should be on disc and accompanied by a brief description of their purpose and operation. A stamped addressed envelope with your submission will ensure the return of your disc.

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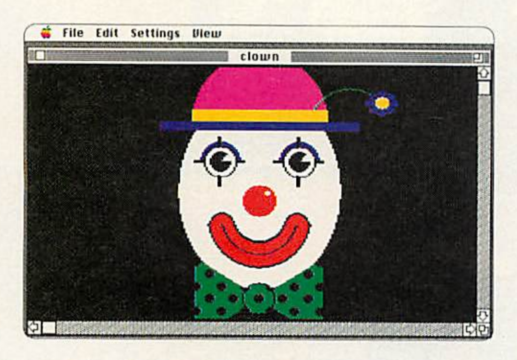
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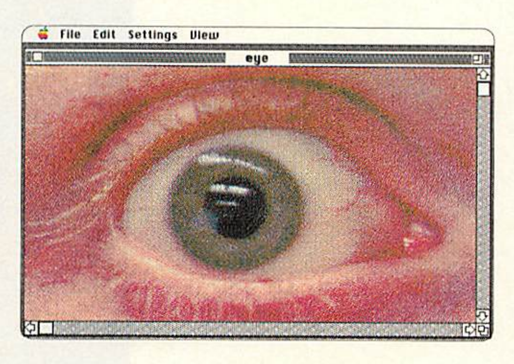
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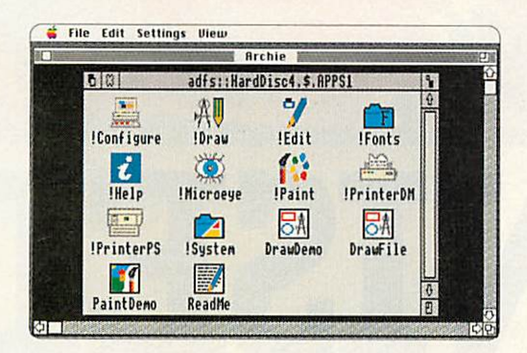
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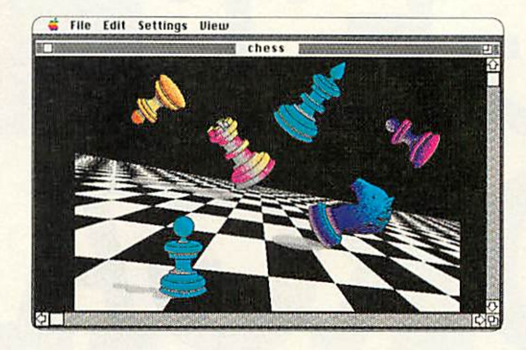
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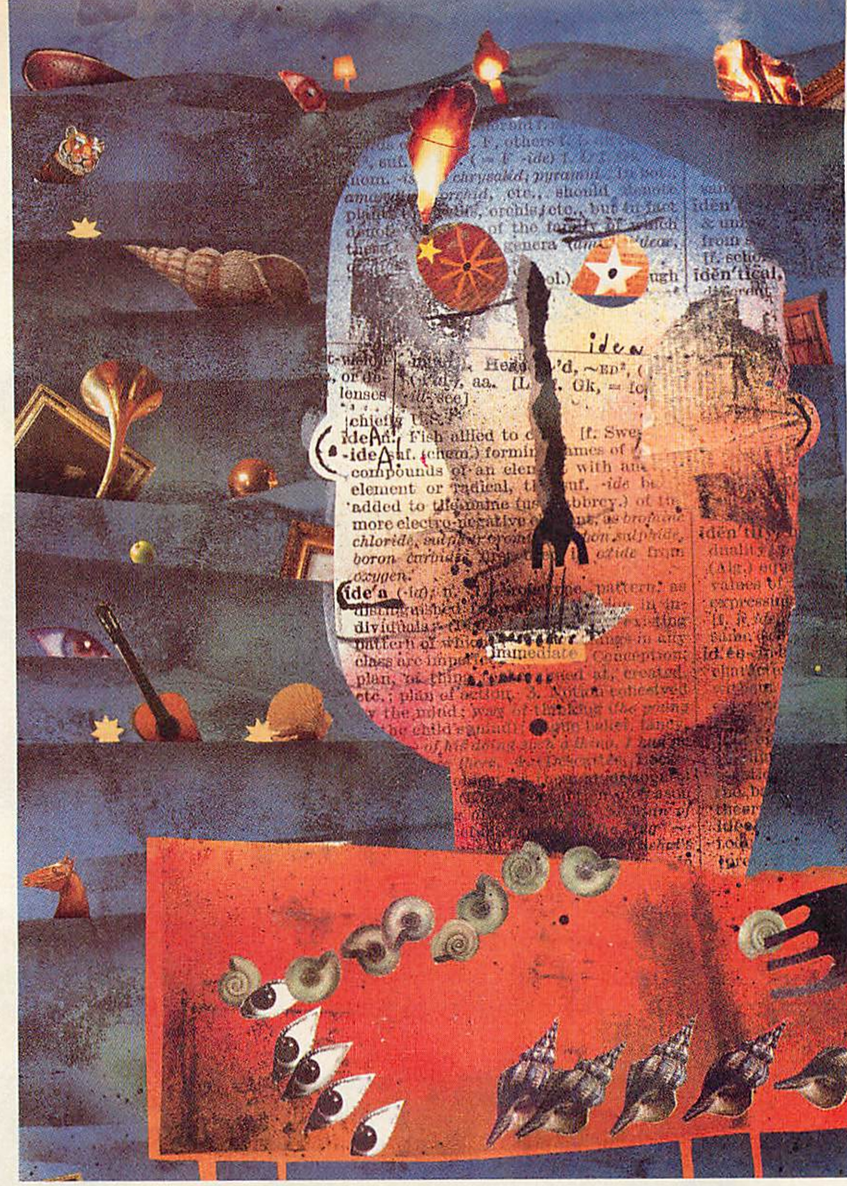


ILLUSTRATION BY MATTHEW RICHARDSON

GET ORGANISED

Finding it difficult to get a project started? **TONY PATTERSON** explains how you can get your thoughts to flow using Innovation, BAU's very own ideas processor

DTP packages and wordprocessors are increasingly used on the Archimedes for writing very long documents. From students' essays to technical manuals, all manner of published works have been prepared on 32-bit machines. Steve Furber's book *VLSI RISC Architecture and Organisation* was written using *Twin*, for example. Lengthy tomes like this need a lot of planning before the writing can actually start, which is where the ideas processor comes in.

An ideas processor is a tool designed to help you organise your thoughts in a clear and logical order, so you can structure your writing effectively and cohesively. *Innovation* is such a program. It is based loosely on the ideas processor written by Joe Telford and published in the October 1988 issue of *BAU*. Due to its large size it is only available on the monthly disc, so if you have not got a copy, you should turn to the order form, just before the yellow pages.

Innovation can be loaded in the normal way, by double-clicking on !Innovate. It has interactive help support, so if you like to learn by doing, load the *Help* program from applications disc 1 to take advantage of this facility.

When *Innovation* is loaded, its icon, in the form of a light bulb, appears on the pale-grey icon bar at the bottom of the desktop screen. The initial window can be opened by clicking the mouse once on the *Innovation* icon, it will appear near the centre of the screen. At first sight it is probably quite unusual. If you move the pointer across it you will find that the pointer changes into an I as it moves over the blank part of the window, the text area, and back to an arrow when over the hyphens and semicolons at the left-hand edge, the numbers area.

Move the pointer in to the text area to get the I-shaped pointer and click Select. The window border will turn yellow to show that it is waiting for input, and the caret will appear in the top left of the text area. The hyphens will have now been replaced by digits representing the idea's number. The digits are in the form mm:ss:ii, where each pair represents the number of the current heading with respect to the level of all the previous headings.

The mm represents the current main-heading number, and the ss and ii represent the sub-heading and minor-heading levels respectively.

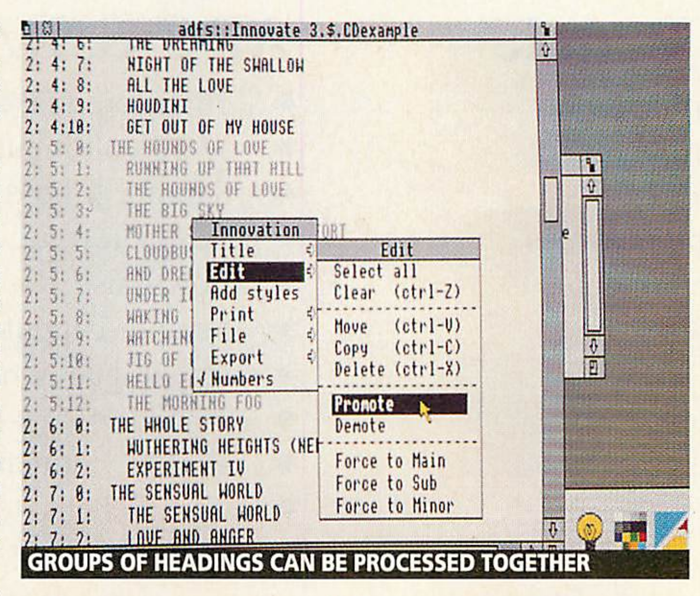
The numbering works like the chapter numbering in a book. Numbers start from 1 for each level, and begin again whenever a higher level heading is used.

An easy way to change the level of a heading is to click Adjust while the pointer is over the text area. This cycles through the different heading levels. The number will change according to the level you select. You will also notice that the caret moves when the level is changed because the lower levels have successively larger indents. Try typing something in and adjusting the level. The text will now move with the caret. To move to a new idea, press RETURN or use the cursor keys.

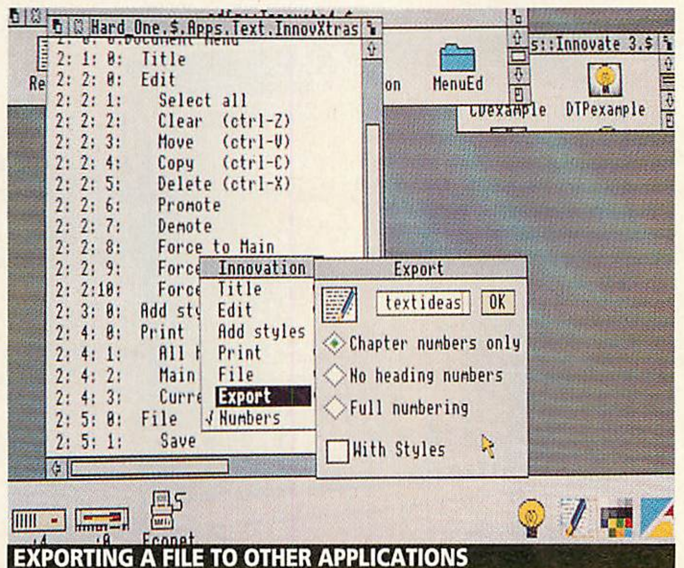
The new idea will inherit the heading level of the idea directly above it. Once you have typed in several headings, you can experiment by changing the levels of individual ideas to see how the numbering changes. If you want to insert an idea between the line the caret is on and the line above, INSERT can be used to add it in.

One of the first things you will want to do when you prepare a document is to give it a title. This is done simply by clicking Menu over the main window. The first option on the menu that appears is Title. Move over this to bring up the writeable sub-menu, in which you can enter your chosen title.

The next item on the menu is Edit. This covers all the operations that can be applied to groups of ideas. Selecting a group of ideas works in a similar way to selecting files in a directory viewer. To select one idea, move the pointer over the number area of that idea and click Select. The idea will appear in grey to show that it is selected. Any number of ideas can be selected in this way, but it is often more convenient to select several headings together.



GROUPS OF HEADINGS CAN BE PROCESSED TOGETHER



EXPORTING A FILE TO OTHER APPLICATIONS

This can be done by dragging the pointer over the number area with Select depressed. A pale grey bar will follow the pointer, covering all the ideas between the point where Select was first depressed to the point at which the pointer now is. When you are satisfied with the group of headings beside this bar, release the mouse button, and they will all be selected.

The Adjust button can be used in the same way to de-select headings. Under the Edit sub-menu you will find two options, Select all and Clear. These can be used to select or deselect all the headings in one go. The standard Move, Copy and Delete functions can also be found here. Delete removes all the selected headings from the document. Copy copies all the selected items to before the line with the caret, in the order in which they appear. Move performs a Copy followed by a Delete. These can all be performed using standard key shortcuts. Later in this piece, you will find a box listing all the special function keys available from *Innovation*.

The other sections of the Edit sub-menu are for changing the heading levels of several items at once. Promote and Demote will either increase or decrease the level of all the headings by one, so that promoting a group of headings will cause sub-headings to become main headings, and minor headings to become sub-headings. Main headings, however, will remain unchanged. The last three Force options on the menu will cause all of the selected headings to be set to the specified level.

You can now enter ideas and edit them quite effectively, so you will probably want to save them to a file. The File option of the main menu leads to a small sub-menu with two options. Save leads to a standard save dialogue, which can be used in the normal way, and Info leads to a file information window.

There are two ways of loading a file into *Innovation*. The first is to double-click on the Files icon, which will load the file into a newly loaded copy of the program. The other way is to drag the file on to the Innovation icon. This will load the program into the already running *Innovation*. It will however overwrite the file that is currently being edited by that program, so check that this is all right before attempting to load a file like this.

When editing very long documents you may find that the update of the numbers becomes irritatingly slow. To speed things up it is possible to switch the numbering off by selecting Numbers from the main menu. When the numbers are switched off the tick will disappear from beside this option. The numbers will now be replaced by hashes (#), to save *Innovation* the work of recalculating them. Selections can still be made in the numbers area in the usual way.

Anybody familiar with DTP programs like *Acorn Desktop Publisher* or *Impression* will be familiar with the concept of styles. Styles are combinations of effects that can be applied to text to alter its appearance. The different effects determine things like the font used, the colour of the text, its size and the space between lines. DTP programs usually allow you to set up such styles and give them names. One such style might be called Title, which sets 40pt (large) Homerton bold font in a dark blue colour. When importing text in to a DTP program it is possible to include special commands within the text to

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tell the DTP program that a specific area of text should be printed using a particular style. For example, if you were importing text into *Impression* you might include the commands {"Italic" on} and {"Italic" off} to italicise the intervening text.

The purpose of the Add styles dialogue, which is brought up by clicking on the main menu Add styles option, is to allow you to assign different styles to the different heading levels of your ideas file. Load or type a file in to *Innovation* and bring up the Add Styles box. You will find four Style On settings, and a corresponding four Style Off settings.

These should already have Style labels for *Impression* in them. If you want to alter the styles, click in the appropriate box and press CTRL-U to erase the current text, and then enter a new label to replace the previous ones. If you wanted to change the Minor style to use italics you would click Select on the Minor style on box, erase its current contents and enter something like {"Italic" on} for *Impression*, or <Italic> for *ADP*. Pressing RETURN will take you to the Minor style off box. *Impression* users should enter {"Italic" off} in here, *ADP* users should leave it blank.

When you are satisfied with your set of styles you will be ready to export your ideas to a DTP or WP program. This is done using the Export dialogue box, available from the main menu. The Export dialogue is, despite its appearance, very similar to a normal save box. The text icon, the OK button and the filename field behave in exactly the way you would expect the same items of a save box to act. The group of three diamond-shaped radio icons determine the way in which the text will be output.

There are three possible options. The first option is perhaps the most useful one, outputting the text without any indentation and supplying numbers for chapters only. The second option exports text with no numbers and no indentation, although it is possible to add indentation by exporting with styles which are set up to contain a suitable number of blank spaces, or the {tab} command for *Impression*.

The third option emulates a style much favoured in technical manuals, and similar to that used by *Innovation* itself. The numbering is in the familiar mm:ss:ii form, and full indentation is used. The tab commands (Ascii code 9) used here are not used by *Edit*, so if you are preparing text in *Edit* you might want to use the Find option of that program to change the tabs into pairs of spaces. There are two more buttons in the Export dialogue.

The first, With Styles, is used to tell *Innovation* whether or not you want it to use the styles from the Add Styles box. Switch it off if you do not want the styles transferred. The final button switches the double line feed on and off. When exporting text *Innovation* puts two line feeds between each line instead of one, as it makes it easier to type text in between headings, and to be sure of it being in the correct style for body text in DTP programs. For some applications it is not desirable to have these double line feeds, so this button can be switched off.

It may be that you would prefer to have different styles set up in *Innovation* when you start to use it, rather than to forever alter the Add Styles dialogue. To make it easier to change the default settings, there is a file called Styles in the *Innovation* application directory, which holds the default style information. To alter this double-click on !Innovate while holding down SHIFT key, and load the Style file into *Edit*.

You will find that the file is fairly well commented, and that by overwriting the supplied values, you can alter the default style, the setting of the Numbers option on the main menu, and even the number of characters in an idea. Be careful when you alter this. Making it too high can use a lot of memory up, making it too low can cause ideas to be truncated when loading files from a version of *Innovation* configured to use longer lines. In any case this value must be in the range 1-255. It is wise to make a backup of *Innovation* before altering this file.

It is possible to use the Export section of the program to print files using a printer driver or wordprocessor, but it is much more convenient to make use of the printing functions built into *Innovation*. There are two methods of obtaining hard copy from a program. The easiest of these is to use the Print option from the main menu. This leads to a sub-menu with three printing options on it. Before using this make sure that your printer is ready, and is not being used by any other program. This method will not work with any dedicated Risc OS printers like direct drive lasers. The first option prints All Headings and it simply prints out the whole ideas file.

The second can be used to print Main headings only, ignoring all sub-headings and minor headings. The final option, Current Chptr prints all the ideas between the previous and next main headings, relative to the caret.

The other method of printing is to use the Risc OS printer drivers, and is the only means of printing to direct drive lasers. This is done by dragging or saving an ideas file to the appropriate printer driver icon. To print a file using the style of output used by the Export dialogue, save the file from this window to the printer driver.

It is possible to redirect the printed output to a file by setting the system variable Ideas$Printfile to the filename. You can also set it to the names of the system devices such as serial:. The effect of using serial: would be to send the file out through the serial port. If a printer driver is or has been present in the machine, and printer: is used, the printer driver will redirect the output to its specified stream.

Finally, there is the search option. All you have to do is to bring up the Find idea dialogue from the Search option of the main menu, and enter a string to search for. Click on OK or press RETURN, and *Innovation* will find you the first occurrence of that string in the file, placing the caret at the beginning of the relevant line. Subsequent matches can be found by pressing CTRL-N. This search function makes it possible to use *Innovation* as a simple database.

That's all you need to know to start planning your documents with *Innovation*. Don't feel you can only use *Innovation* as an ideas processor though, since it can be used as anything from a programmer's tool for designing Risc OS leaf menus to a simple database. We would be very interested to hear about how you put your *Innovation* to use.

INNOVATION KEYS

CTRL-C Copy selection
CTRL-F Find idea dialogue
CTRL-J Join lines
CTRL-N Next match
CTRL-S Split lines
CTRL-V Move selection
CTRL-X Delete selection
CTRL-Z Clear selection
PRINT Print menu
F2 Force to main
F3 Force to sub
F4 Force to minor
F5 Open Add styles window
F6 Open Save as window
F7 Promote
F8 Demote
F9 Save using current leafname
F10 Clear all
F11 Select all
INSERT Insert line
SHIFT-INSERT Delete line
CTRL-PAGE UP Previous main heading
CTRL-PAGE DOWN Next main heading
HOME Open Export window
COPY Forward delete
SHIFT-COPY Delete to space
CTRL-COPY Delete end of line
SHIFT-CTRL-COPY Delete start of line

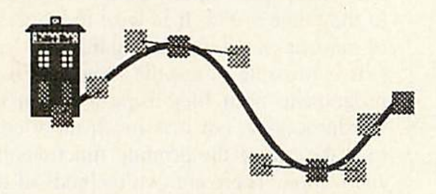
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"Any discussion of design with the Archimedes must include what has virtually become the standard 3D graphics and animation system.

I mean of course the *Euclid/Mogul/Splice* trio of packages from Ace Computing. *Euclid* is a Risc OS compliant, interactive, multi-document, 3D, graphics and animation program which is so easy to get to grips with.

Designs can be put together, rotated in real time, zoomed in and out of and viewed in perspective from any position...

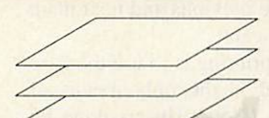
...It is interesting to note that the next set of BBC TV's *Science Challenge* programmes employ *Euclid* graphics."

CHRIS DRAGE Education section
BBC ACORN USER February 1991



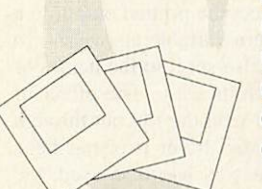
Ace Computing

IMAGESETTING



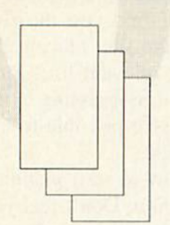
- BROMIDES
- NEGATIVES
- POSITIVES
- DIRECTLY FROM ADFS DISKS

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CHARACTER BUILDING

Tired of staring at the same old font on your Beeb? **JAMES RICHARDS** offers relief with this snappy little font designer

Archimedes owners have a choice of outline fonts but Beeb-owners can redesign their typeface too. You have to stick with characters that fit inside an 8×8 grid but these are surprisingly versatile.

Characters 224 to 255 are normally set aside for you to define your own special letters or symbols. These can be used for characters like copyright signs or daggers. The commonest use of them, though, is for simple games.

Each character is an eight by eight 'sprite'. The blocks can be either set or unset. To do this manually you first need to draw your grid, then fill it in block by block. Getting this information into the Beeb is a matter of turning this grid of squares into numbers.

FIRST BASE

Each row represents a byte. A byte is eight binary digits (zeros or ones, black or white), and is a representation of a number in base two. Taking these 'sprites' and converting them into computer data is a simple case of taking each row in turn and turning it into base 10. Alternatively, you can convert data in half-bytes or 'nibbles' using the hexadecimal system. All the possible hexadecimal patterns for nibbles are shown in Figure 1.

To convert the copyright symbol into numbers you take each row in turn from the top down as in figure 2. Each bit represents a decimal value, each of which goes up in powers of two from the first bit, just like base 10 numbers go up in powers of 10. So the first row is 0+0+32+16+8+4+0+0 which comes to 60.

A quicker way of doing this is to convert the binary bytes into hexadecimal, base 16. This is done by taking the two halves of the byte and comparing them with figure 2. Take the first row of the copyright symbol. Break it in two and match the pairs up with the table. The left hand side matches with 3 and the right hand side matches with C so the hexadecimal value of this row is &3C which, if you convert it into decimal, by typing PRINT &3C, is 60.

After you've done this eight times (once for each row) then you'll have eight numbers, in decimal or hex. To redefine one of the user defined characters type: VDU 23, charnum, row1, row2, row3, row4, row5, row6, row7, row8 where charnum is the number of the character. If you use the hex system then you'll need to put an & in front of each number. This new character can be displayed by typing VDU charnum, or PRINT CHR$(charnum). Hence if you then type in VDU 23,224,60,66,153,161,161,153,66,60 then VDU 224 the copyright symbol will be displayed, as long as your computer isn't in Mode 7.

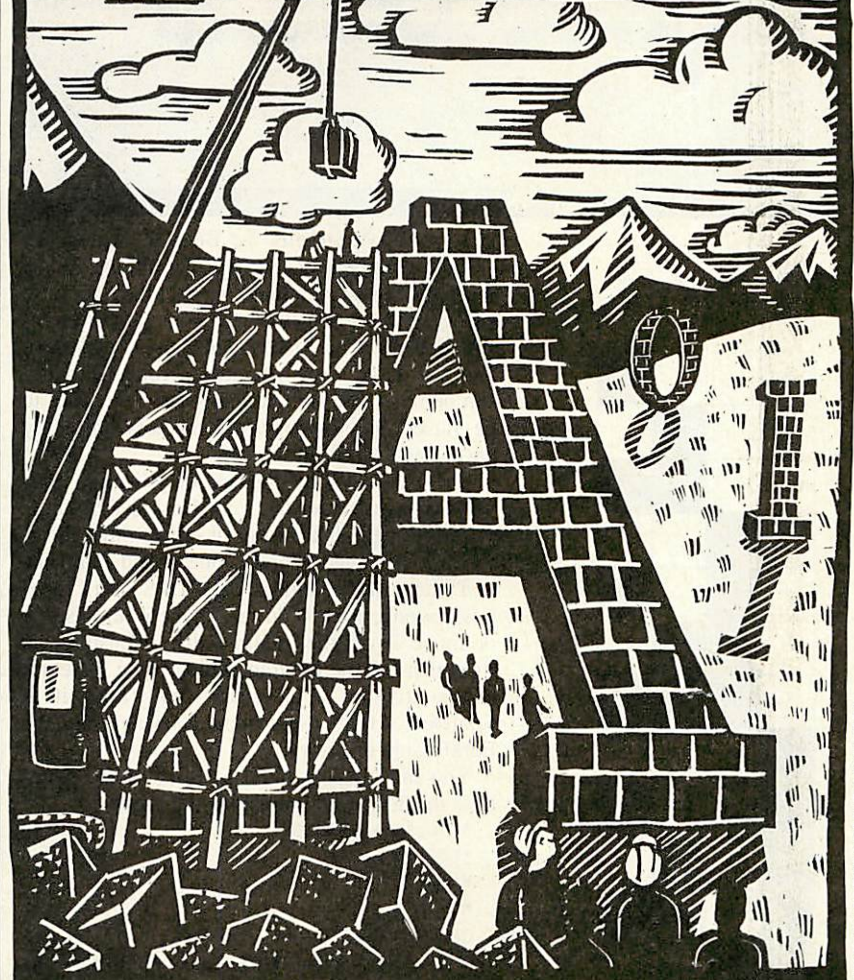
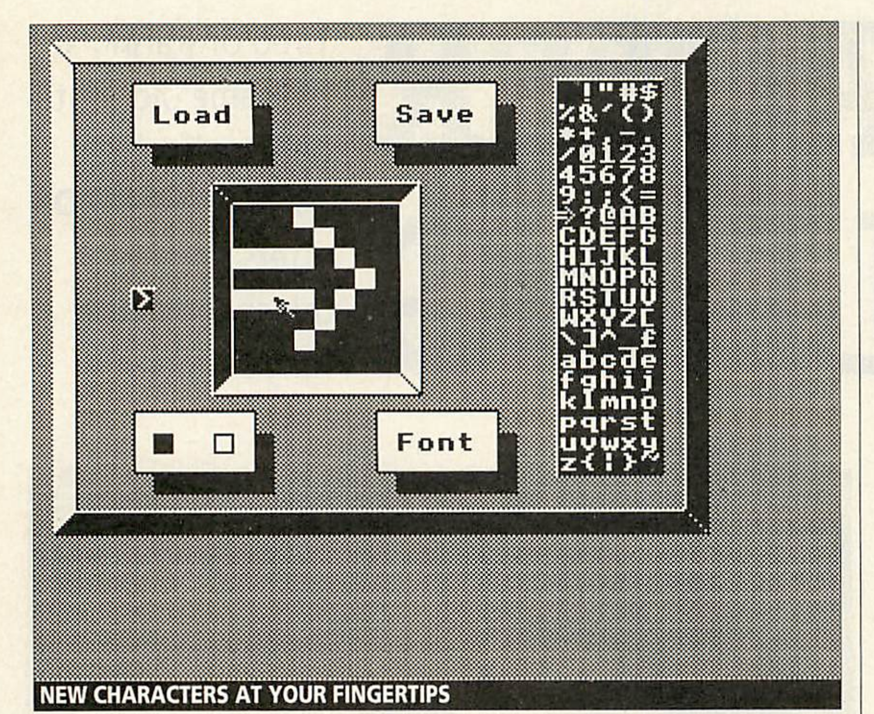


ILLUSTRATION BY ANGELA WOOD

Fontdesigner, or *FontDes* to its friends, lets you design your characters, simply and quickly. It will also turn the fonts into a machine code file that you can *RUN. When you do this all your system characters will be miraculously redefined.

Redefining the user characters from 224 to 255 is straightforward – the BBC already has memory set aside for these. However, if you want to redefine characters 32 to 223 then you'll need to tell the Beeb to set aside some extra memory to store the extended definitions.



NEW CHARACTERS AT YOUR FINGERTIPS

8 4 2 1

0 1 2 3 4 5 6 7 8 9 A B C D E F

1: NIBBLE HEX PATTERNS

Command *FX 20 tells the Beeb to explode an area of memory for the new definitions. When you issue this command you'll need to raise PAGE a little. PAGE is where your programs are stored from. The font designer uses *FX 20,6 so that all of the Ascii characters from 32 to 127 can be redefined. When this is done PAGE has to be raised by six pages of memory, meaning PAGE=PAGE+&600.

The program is the one and only listing on the yellow pages under the Font Designer heading. Format a new disc and on it create three directories, one called Library, one called FontData and one called FontDesigner. DFS users obviously won't need to do this. Type in the listing, or move it off the monthly disc, adjusting the lines that tell the program which filing system it is operating in – these are vital!. Save it as FontDes. ADFS users should save it into the FontDesign directory.

You may like to build a !Boot file to Autoboot the disc. ADFS users should type:

```
*Build !Boot
*Basic
*Mount 0
*Dir FontDesign
CHAIN"FontDes"
```

and then press ESC. DFS users should type the same but replace the *Mount 0 command with *Drive 0 and delete the *Dir FontDes command. Then type *OPT 4,3 to make your disc auto-boot when you press SHIFT-BREAK.

If all is well, then when the program is booted, the menu screen will be drawn and a little pointer will pop up which you can move around with the Z X ; and / keys. Holding down SHIFT will speed it up for the more racy of you.

The column of characters on the right hand side of the screen shows the font you are designing. To bring up a character in the editing window (the large square in the middle) move the pointer over it and press RETURN. The character will be displayed in the large window and you can see the tiles that make it up. Moving the pointer over this window and pressing RETURN will set or unset an individual pixel in the character. The two boxes in the window on the bottom left will clear or set all the pixels in the editing window.

While you edit the character it will be updated in real time in the Ascii table on the left of the screen. On the right of the screen is the real Ascii character that you are editing. This is there to remind you what to make your character looks like. It also serves another purpose – click on it and it will be copied into the editing window and restore the character in the Ascii table.

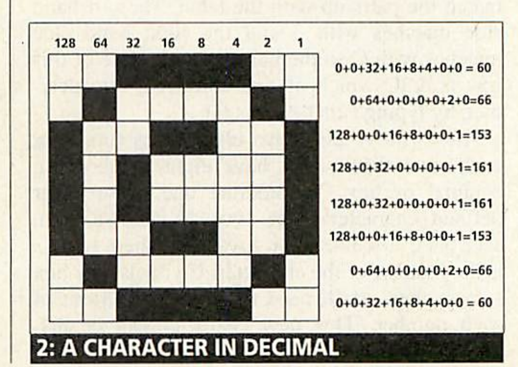
When you have designed your font, or just redesigned a few characters in it, then you'll want to save it. Click on the Save window and you will be asked if you wish to see a catalogue. Press Y or N. If you press Y the FontData directory will be catalogued in the bottom part of the screen, use SHIFT to scroll.

Type the name of your font and it will be saved as a raw data file, in the FontData directory for ADFS users, or the F directory for those of you with DFS. This file can be reloaded by pressing RETURN over the Load window and typing the name of it.

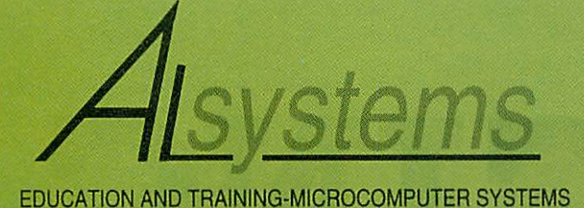
To turn your raw data file into a file that can be *Run then you need to click on the Font icon. You will first be warned that doing this will delete the font you are currently working on. You will then be asked for the name of the raw data to be converted. Type this and you will be asked for the name under which you wish the machine code file to be saved, which can be the same as the raw data file as it is saved in a different directory. This file will be saved in the Library directory (the L directory for DFS users) and is the file that you *Run to change the font.

After the conversion is complete you will be asked if you wish to rerun it or not – the decision is yours. When you put the disc in the drive and type *<fontname> the file will be run and the font redesigned – DFS users need to type *Run L.Fontname. If you have a library disc, put all of the fonts on this, so you can have a different font each time you use the computer. Be careful – because PAGE is raised you will lose any Basic program you are working on, or any text in a wordprocessor, so save what you are doing before changing fonts. Also the program uses PAGE=PAGE+&600, so be sure you either press BREAK or type PAGE=PAGE-&600 before you change the font a second time, otherwise you'll find yourself running out of memory.

As a special bonus there are several fonts on the monthly disc this month for you to try out. If you design any interesting ones then send them in and we'll put them on the next disc.



2: A CHARACTER IN DECIMAL



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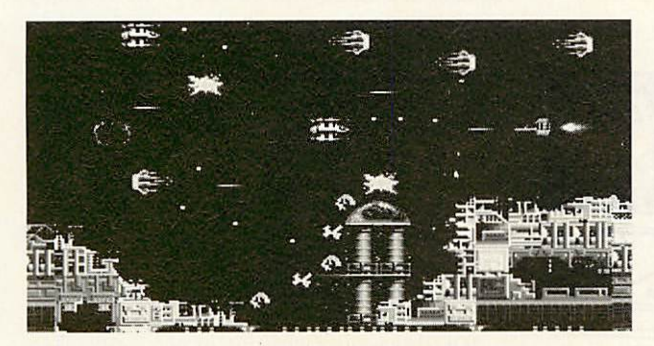
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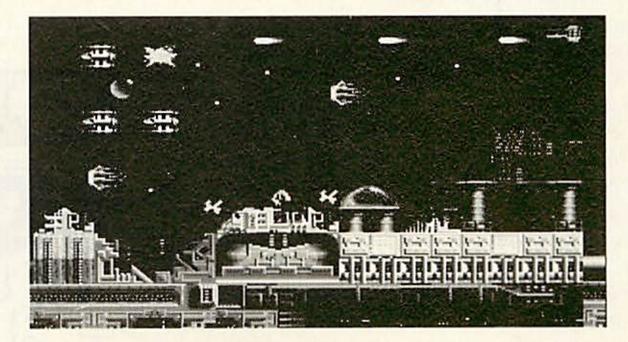
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PROVOCATOR



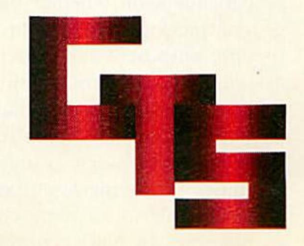


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MANAGING THE MICRO

For the hard-pressed IT teacher, computers can become a constant source of anxiety. **CHRIS DRAGE** comes to the rescue with some sage advice on buying and using micros

National support and funding for IT throughout teacher training institutes is at an all time low if the recent TES/ITTE survey published in July is anything to go by. Furthermore, with teachers' colleges unable to provide adequate IT training the number of teachers confident in implementing IT in the classroom will seriously dwindle, with expertise becoming even more exceptional.

To make matters worse, schools are now responsible for ordering their own equipment, so choosing the right system is more important than ever. Remember – a little forward planning can save an awful lot of trouble later on.

I hope that this article will serve to make schools' purchasing decisions easier. As the standalone machine is the most commonly found in schools everything discussed will be in this context. I have deliberately not referred to eight-bit micros although they still predominate in education, as I feel these are adequately covered in other places.

Teachers often switch off when users of the computer in education begin to enthuse, because their ideas seem to bear little relation to the reality of the classroom. The expert who regards the computer as a vehicle for the development of problem-solving strategies and as the focus of a topic-centred approach has probably forgotten that Class 4C on a wet Friday afternoon, in a classroom with few supplies and one computer, is a recipe for disaster. Indeed the practical problems of integrating a computer into the curriculum, whether it be because of a lack of equipment or software, an inappropriate room layout or over-large and under-motivated classes, often defeat even the most willing of prospective users.

BOOTING UP

The hardware you choose at the initial stage will be dependent on whether the A3000 is to be a general-purpose machine or is designated for a specific purpose – for example CAD, a graphic design tool, or control technology.

The first task is to convince colleagues of the advantages that additional hardware will bring. With this end in view it may be wise to use the machines in a general-purpose role where they are accessible to as many children and teachers as possible. In hard economic times you may have to resort to such ploys to get IT funding within the school.



'no matter how good the package there will always be something that you wish it would or wouldn't do'

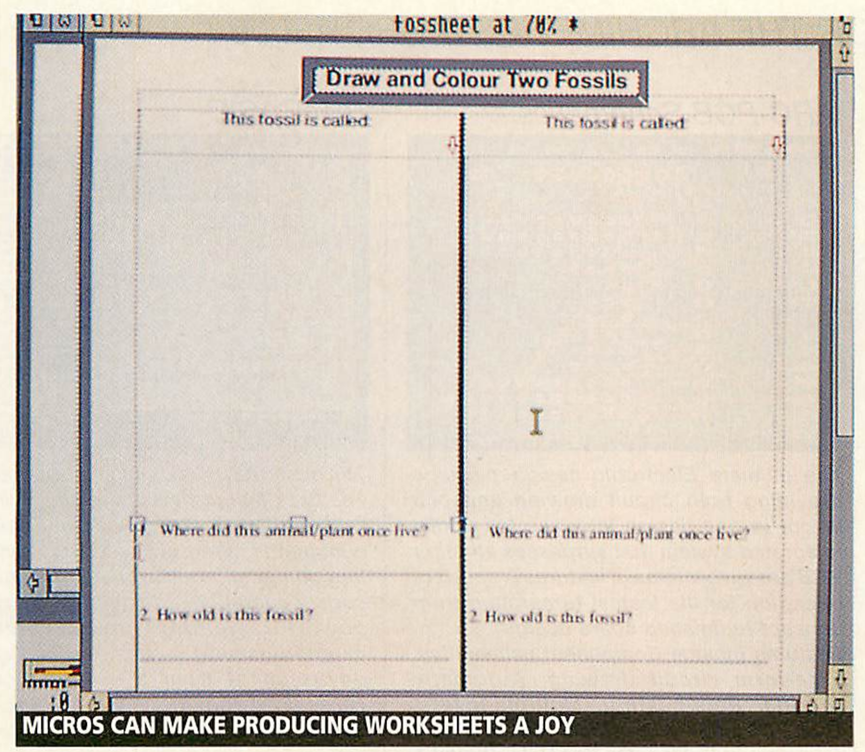
Although I suspect that few teachers know what their future hardware requirements will be it will save a great deal of later frustration if, when designing the computer system, you include the cost of any hardware and software you deem necessary in your initial shopping list. Experience has shown that it is easier to bid for items at the start than to have to go back with yet another request at a later stage.

If you purchase an A3000-based system make sure that it includes a hard disc. This offers a huge storage capacity and superior speed in comparison with a floppy drive, and is now becoming a necessity rather than a luxury due to the large amounts of data being transferred to and from the computer. The hard disc also helps run applications smoothly and efficiently with the result that children spend less time waiting for data transfer. Do ensure that your micros contain at least 2Mb of memory; 1Mb is simply not adequate for many of the applications you will wish to use.

A structured approach to the organisation of files on the hard disc is essential as is a rigorous approach to backing up the disc at regular intervals. Beebug's *Hard Disc Companion* is a good back-up program which effectively stores data in a compact format, saving floppy disc space. To prevent the hard disc becoming full only store applications, fonts and frequently used resources on it, saving children's work on a pair of floppy discs at the end of each session.

IDE drives are increasing in popularity. They are cheap, fast and you can obtain devices that will fit inside the A3000. Also as they can protect data from being altered I would recommend them for standalone machines. However, SCSI drives such as those by Oak Solutions offer the ability to daisy chain another hard drive, or devices like CD-Rom players, and at present offer by far the largest storage capacity.

Once you have a SCSI interface you are able to daisy chain up to seven devices, one of which can be a removable cartridge drive like the SyQuest 5.25in system available from Norwich Computer Services. Cartridge drives are fast, store huge amounts of data and have one other important advantage – portability. It's like being able to take out the hard disc and replace it with



MICROS CAN MAKE PRODUCING WORKSHEETS A JOY

another, in much the same way as a 3.5in floppy disc drive. The SyQuest system offers a neat solution to the problem of backing up, providing a convenient means of maintaining data integrity. Additionally your drive is not limited to a specific storage capacity. The cartridge drive is also a good way to back up or reinstate data on existing SCSI hard drives as the removable drive is simply daisy chained and the data backed up.

Your school may already have spent a substantial amount on printers and it makes sense to use a spare one if possible. Do investigate as to whether any parents are currently upgrading their printers at work. If so, suggest that one be donated to the school. My school acquired two printers in this way.

Don't forget to include a suite of software in your initial budget proposals, taking account of the computer's proposed role, and the age and needs of the target group. Remember also that the computer can be used by teachers as well as by pupils. Your programs may be bought from software publishers, borrowed from your local education centre or produced in school by teachers and pupils. However, no matter how good the package there will always be something you wish it would or wouldn't do.

If the computer is to be used for general purposes then a wordprocessor/presentation package would be top of my list. In this area you are spoilt for choice; there is *Phases#2* from Northwest SEMERC, *Desktop Folio* from ESM, *Pendown* from Longman Logotron, *Impression* and *Impression Junior* from Computer Concepts and *Ovation* from Beebug.

One thing all teachers need to do occasionally is to create worksheets for their pupils. A well designed and desktop-published worksheet not only increases its legibility but also its interest value. The example illustration began life as a beautifully hand-written quiz sheet which many of the eight-year-old recipients could not decipher. I therefore used *Draw* to produce a simple



'Familiarising yourself with a computer in a home environment is more productive than a formal training session'

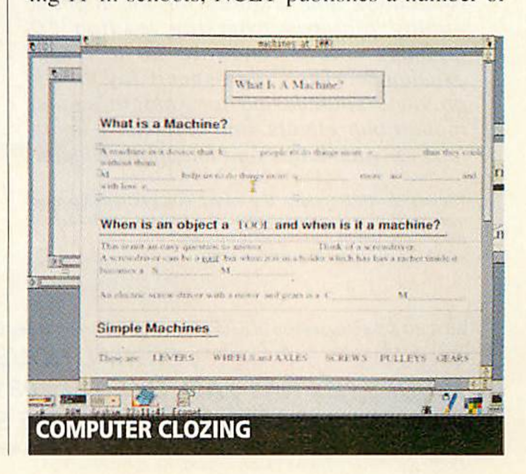
map which I imported into an *Impression* page containing the questions. As the school's photocopier had broken down yet again I simply produced 30 copies on the printer. If you have access to a laser printer the process is considerably speeded up. Anyone with access to a LaserDirect printer system from Computer Concepts will find that they hardly need to use the photocopier for school letters, information sheets or pupil's worksheets. It certainly makes my school's office just a bit envious of the quality and presentation of each document – something they find difficult to achieve on their PC compatible!

An item which won't break the bank is *FontFX*, useful to design logos and interesting textual effects for inclusion in DTP work. Although not of the calibre of 4Mations' *Poster*, it is simple and fun to use, adding an interesting and imaginative presentation to your work.

Forms Designer and *Fancy Labeller* both by MEWsoft are two Risc OS programs which by their very nature are valuable software tools in the teacher's armoury. *Forms Designer* combines large typefaces, standard sized text, lines, boxes and grids to design forms up to A4 size. A teacher can produce a set of very professional forms or worksheets without having to spend a fortune on software. Similarly, there are always times when labels are required in schools for bookplates, discs, drawers, cupboards, jars, instructions and so on. *Fancy Labeller* is a delightful little program which combines different typefaces and intricate frames to assemble and print attractive labels. It also includes an option to design your own frames and fonts.

Not unnaturally there is a learning curve involved and staff won't be able to fully use the power of the A3000 until they are proficient users. As time for training just isn't available let staff take the A3000 home to play with. Familiarising yourself with a computer in a relaxed home environment is far more productive than a formal training session.

Sources of information and assistance are available. For first-time users *Arc For The Anxious* is informative, and it also describes *Pendown* in some detail. Sherston Software produces two very useful discs entitled *Help* and *Draw_Help*, reviewed in this issue, both of which are indispensable in helping to familiarise users with the Arc and its application software. For an overall discussion of the issues concerning IT in schools, NCET publishes a number of



COMPUTER CLOZING

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DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000

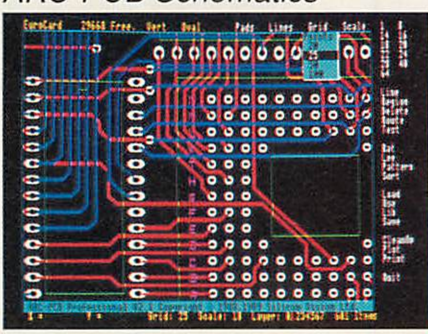
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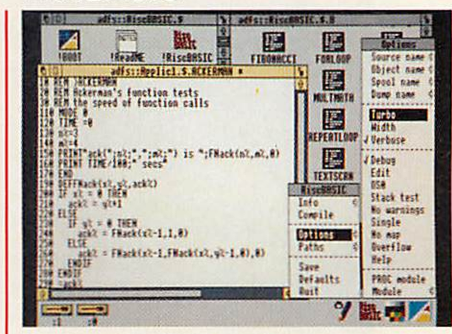
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- BBC Acorn User February 1989.

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- RISC USER August 1989.

"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

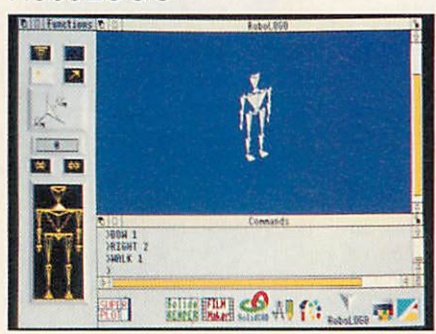
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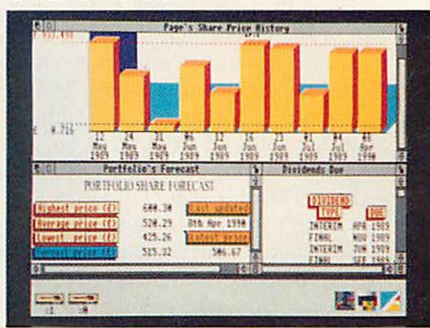
RoboLOGO



This new extension to traditional LOGO, provides three dimensional control of an articulated humanoid or animal figure based on the standard LOGO language. Natural commands such as 'Walking', 'Turning', 'Bowing', and 'Picking', etc are automatically represented graphically by natural movements of the 3D figure which is readily understood by students using LOGO as an introduction to computing. The traditional Turtlegraphics & 3D Glider features are also supported for students to further explore their school work.

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- Archimedes World March 1991.

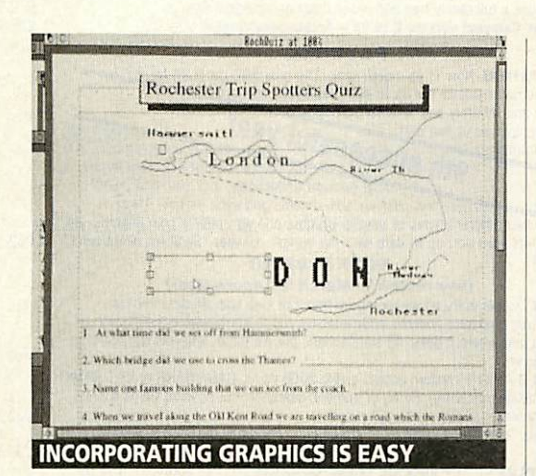
All RISC OS software run in native mode on all Archimedes Computers & BBC A3000 with 1 Mbytes.

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INCORPORATING GRAPHICS IS EASY

documents on the subject for example, *IT In Primary Schools: 1 Issues For Teachers.* Don't forget that *BAU* and *Educational Computing & Technology* also offer help, information and reviews of current hardware and software. Also see the First Steps article, which started in January, and its continuation Stepping Up, here in this magazine.

MAKING IT BIG

Careful thought must be given to the positioning of the computer in the classroom, which should be linked to its intended use. If you intend to use it as an electronic blackboard or as a catalyst for class exercises or discussions, then your monitor is the prime consideration. First, it needs to be large enough so that all the class can see it. Software manufacturers often overlook this aspect and create screen layouts that use small print. If the children can't see it, they won't watch it! Check out *Big Screen* and *Screen Viewer* from Northwest SEMERC which magnify the image on the screen. Second, the monitor needs to be at a height that makes it easily visible. Third, it must be positioned away from direct light or reflections from windows.

If pupils are to work at the computer in groups, remember that the machine is likely to be a distraction to other members of the class. The monitor should therefore ideally face away from the class and the group should have easy and comfortable access to all the controls. This will necessarily limit the size of your group. Individuals working at the machine require similar conditions.

If you use the computer as a teaching tool your approach will be very different. The teacher remains the focus of attention and the communication is from teacher to pupil and vice versa, with little inter-pupil work. In this mode of use the computer is used as a resource not as the centre of focus.

No matter how proud you are of work produced by pupils on the A3000 don't forget that a machine is only as good as its maintenance contract. The chances are that your authority has already offered you a maintenance contract, but do get your IT coordinator to check what will happen under LMS – nothing is guaranteed to turn your colleagues against IT more than faulty equipment that can't be fixed immediately.

Supplies are something that the school's IT coordinator should have in store. Remember that you will need printer stationery; continuous fanfold paper or labels for dot-matrix printers, roll paper for ink jets and A4 copy paper if you should be lucky enough to own a laser printer. Similarly, don't overlook the need for ribbons, ink cartridges and toner/developer kits. If you are a dot-matrix printer user, remove the printer ribbon during the holidays and store it in a plastic bag, removing as much air as possible. More often than not faded ribbons have not run out of ink but simply dried up.



'Nothing is guaranteed to turn your colleagues against IT more than equipment that can't be fixed immediately'

GETTING RESULTS

The way in which you organise the computer in the classroom will have a significant effect on the results obtained. Use by individual students is restrictive in that it doesn't encourage the broader activities that involve co-operation and discussion. Even high-level maths problems are better tackled in this way. The group is likely to benefit from using the computer as a focus for its ideas and as a means of testing its hypothesis.

The uses of computers in education are many and varied, and the following list is meant as a springboard only: instructing, learning aids, revision aids, testing, simulating, monitoring, controlling and operating; extending thought processes by creating problems and a context for their solution; manipulating text, numbers and ideas; calculating; creation in a variety of forms – musical, graphical, and textual; stimulating ideas, processes and discussion; releasing the inhibited and the disabled by circumventing their disabilities.

PRODUCT DETAILS

- Teacher Friendly – A Guide To Using Micros In the Classroom ISBN 0 905 11467 1.
- Big Screen and Screen Viewer both cost £5 from Northwest SEMERC, Fitton Hill CDC, Rosary Road, Oldham OL8 2QE. Tel: 061-627 2381.
- An internal IDE hard disc for the A3000 is available from Ian Copestake Software, 10 Frost Drive, Wirral, Merseyside L61 4XL. Tel: 051-632 1234. A 20Mb drive costs £375, and a 40Mb drive, £575. Educational discounts are available.
- A removable SCSI 42Mb drive is available from Norwich Computer Supplies, 96a Vauxhall Street, Norwich NR2 2SD. Tel: (0603) 766592. The drive and cartridge costs £472.34; £643 with an Oak Podule, and £626 with a Lingenuity podule.
- Hard Disc Companion, £34, from Beebug at 117 Hatfield Road, St Albans, Herts AL1 4JS. Tel: (0727) 40303.
- Arc For The Anxious ISBN 1 85212 0592
- Impression, £110, and Impression Junior, £59, from Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63933.
- FontFX, £10 plus 50p p&p, from Data Store, 6 Chatterton Road, Bromley, Kent. Tel: 081-460 8991.
- Forms Designer, £19.90, and Fancy Labeller, £27.90, from MEWsoft, 11 Cressy Road, London NW3 2NB. Tel: 071-267 2642.
- Help, £7.95, and Draw Help, £15.95, from Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH. Tel: (0666) 840433.
- IT in Primary Schools 1: Issues For Teachers, £6.25, from NCET, Sir William Lyons Road, Science Park, University of Warwick, Coventry CV4 7EZ. Tel: (0203) 416994.

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(See review in Feb '87 *and Aug. '89*)

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(see review in March '89 *Acorn User)*

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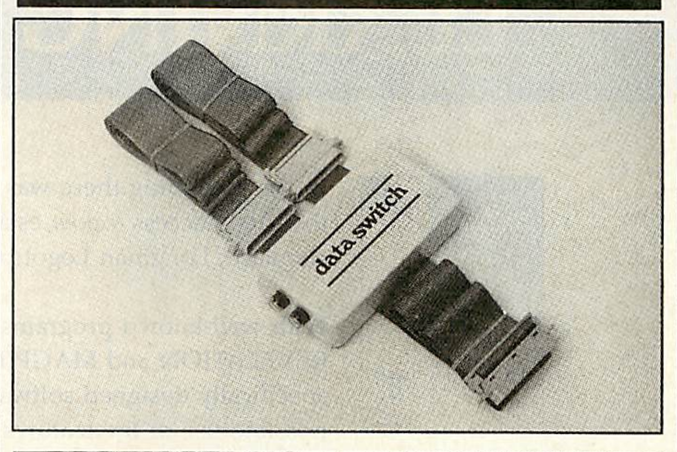


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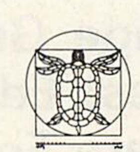
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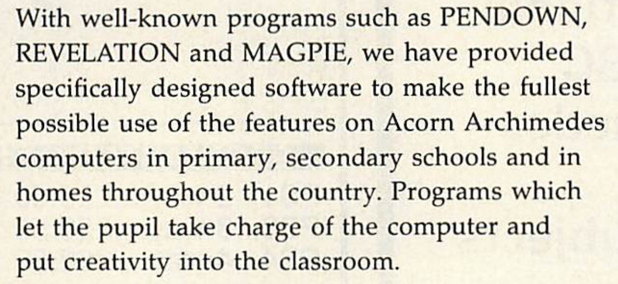
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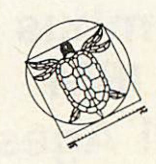


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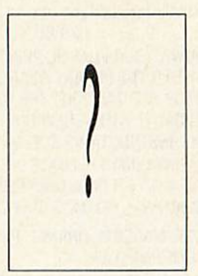




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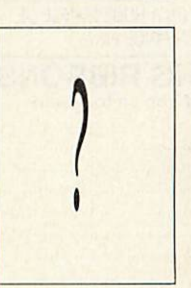


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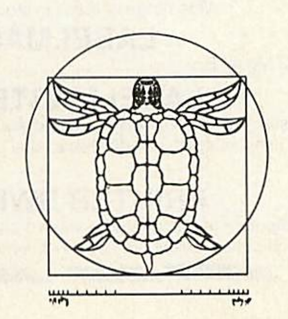
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CHALLENGING THE SYSTEM

PAUL VIGAY goes behind the scenes at the BBC to see how his very own Arc software is shaping up for the new series of Science Challenge

One of the biggest roles of the Archimedes is in education and a new television series will use one as the basis of an interactive hypermedia system. Now entering its third season, a new series of *Science Challenge* will be screened at the end of September.

Science Challenge is aimed mainly at seven- to nine-year-old viewers and features a small group of children playing in their den. Each week, they will be presented with a different challenge which they must solve within an allotted time span. The challenges will range from finding out about sources of energy, what animals cause which sounds and how to transport things from one place to another. Most challenges take place on a fictitious island, onto which two of the children are transported.

The other two remain in the den to examine books, watch film clips and interrogate the computer. This is where I came in. I originally found out about the job when I received a plea from the BBC for 'help in some computing matters'. Intrigued I enquired further. The main specification was to create an alternative Archimedes desktop that could be seen from the back of a classroom and was easy to understand.

As I had a relatively short time to develop the program, I did not to try and write a complete database-type environment, which would probably be difficult for the children to understand and for non-computer users to set up quickly between film takes. Instead I decided to cheat and write a core program that could have different data slotted in each week. I could then preset all the data and provide ten discs throughout the series.

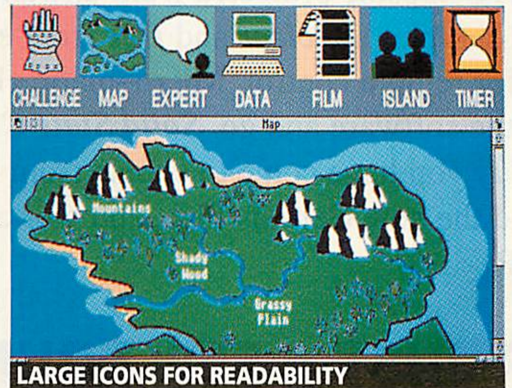
The role of the Archimedes in each program was more that of a tool to provide help and advice, rather than to divert attention from the children themselves. It had to allow the children to work it easily, yet not rely on it too much for the answers.

The main desktop which replaces the conventional icon bar consists of seven large icons with labels underneath, corresponding to Challenge, Map, Expert, Data, Film, Island and Time.

Clicking on Challenge causes a standard Risc OS-style window to pop up containing the actual challenge, displayed in a large font for clarity of viewing. Standard Risc OS windows were used throughout to give an impression of overall similarity and so that the viewer wouldn't think that everything was achieved by special effects. In fact, although you can't really see it in the TV programmes themselves, the entire application still multi-tasks under Risc OS.

Clicking on the Map icon provides a detailed map of the island which remained virtually unchanged for the series, with only the odd place name changed. Graphics were scanned in from original artwork using a hand scanner and tidied up using *Paint*. The next icon, Expert displays the output from a Hawk V9 colour digitiser, to provide the link between the computer and the real world, in the form of camera or video input.

The Data icon allows the children to examine film archives, or a submenu from which more specific data can be gleaned. The Film icon is essentially the same as the Data one except that it is reserved for the actual film clips that accompany the clues of each challenge.



LARGE ICONS FOR READABILITY

The Island icon creates a video window, showing the two children on the island. This acts as a communication link between the studio, or den, and the island being explored.

Lastly, clicking on the Timer icon will display a large scale hourglass showing the amount of time remaining in which to complete the challenge.

As the design of each TV programme tended to vary and I didn't want to restrict the flexibility of the individual scripts, I added a comprehensive menu structure to the Challenge application. Therefore options like making menus appear or icons flash, could be selected between takes by clicking on the required submenu.

Each programme could thus use the same application with the minimum of change. The main difference was in the actual data appearing in the windows. Text files are also used, so that challenges could be entered using *Edit* and then displayed automatically inside a graphical scroll on screen.

After a couple of weeks I had a working prototype program, but the ultimate test was to come in the rehearsals when the children were let loose on it. On the day, I visited the studios in Elstree, so that I could observe any problems that appeared and fix any bugs that encountered. Luckily, the program performed well and, after a couple of cosmetic changes, went on to be used in each of the episodes.

PROGRAMME DATES

Science Challenge programmes 11 to 15 will be shown at 11.35 am on BBC2 during Autumn 1991 as follows:

- Teacher's briefing 18/19 September
- Many hands make light work 17/24 September
- Secrets in stone 1/8 October
- By day, by night 15/22/29 October
- The isle is full of noises 5/12 October
- Sounds and sweet airs 19/26 November

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DTP FOR FREE

Enjoy using this month's free cover-mounted demo disc featuring Desktop Folio, ESM's desktop publishing package – and take advantage of two special offers

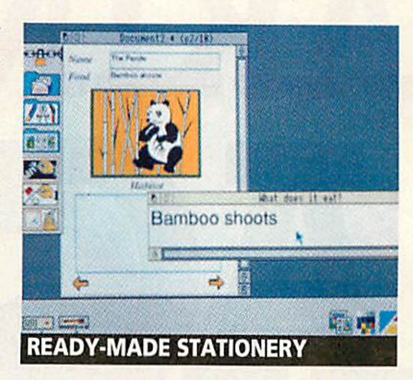
On the cover of this month's issue is your free 3.5in demo disc of *Desktop Folio*, the new educational desktop publishing package designed for education.

Reviewed in our August issue, *Desktop Folio* from leading educational publishers, ESM of Cambridge, is a powerful publishing package which offers wordprocessing, desktop publishing and interactive publishing capabilities. Users of all ages will feel at home with the package, whether it is used for creating work books, writing newsletters, designing posters or presenting GCSE course work.

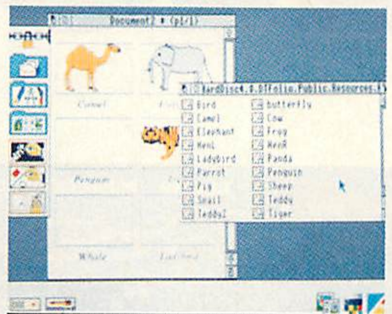
Our demo disc, which will run on a BBC A3000 or Archimedes, gives you an insight into what the package is all about and how you could use it effectively in the classroom, or at home. Features of the disc include:

- A step-by-step guide to using the package
- Actual examples of how to use it creatively
- *Draw* files of useful graphics
- Stationery examples and lots more.

Of course, the demo disc can only give you a flavour of what *DTF* can do – you need the full package to really motor ahead with your DTP objectives. Which is why ESM has put together a special offer for individuals or schools who wish to buy the package, which includes a free Christmas Theme pack (worth £35). This allows you to produce a whole range of material for Christmas, from personalised Christmas cards to advent calendars. Full details will appear in our review of the pack next month.



READY-MADE STATIONERY


INTERACTIVE PUBLISHING

As well as this offer for A3000/Archimedes owners, BBC B/B+/Master users can also take advantage of a special offer on ESM's *Advanced Folio* package, which offers wordprocessing with the presentation qualities of desktop publishing. So, whichever Acorn machine you use, there is a desktop publishing solution for your classroom or home projects.

If you want to see *Desktop Folio* in action, be sure to come along to the *BBC Acorn User* Show (Wembley Conference Centre, October 11 to 13) where the package will be demonstrated on ESM's stand.

In addition, a team of young 'newshounds' will be gathering news at the show and producing a newsletter on the Archimedes using *Desktop Folio*. We hope to see you there.

READER OFFERS

● FOR ARCHIMEDES/A3000 (3.5in disc)
As a special offer to *BBC Acorn User* readers only, ESM is offering *Desktop Folio* with the Christmas Theme Pack (normally valued at £35) thrown in free. To take advantage of this offer, complete the order form bottom right.

● FOR BBC B/B+/MASTER (5.25in disc)
If you do not have an Archimedes, don't worry – you can still take advantage of a special money-saving offer. ESM is offering readers a full £5 off the price of *Advanced Folio*. To apply, simply complete the order form top right. (Add £2.50 p&p for orders under £50).

● HOW TO ORDER
The closing date on both offers is November 1 1991 – so get you order in the post today. Once you have completed the relevant order form opposite, send it to: ESM, Dept 3, Duke Street, Wisbech, Cambs PE 13 2AE. (Please do not send any order forms to *BBC Acorn User* offices).

● HOW TO PAY
Private buyers should send cash with order, or a cheque made payable to ESM. To pay by Access or Visa card, please telephone Customer Services on (0945) 63441. For schools, goods will be sent on credit upon receipt of an official order on a school letterhead or on an ESM order form.

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ET601	Advanced Folio* 80 Track Standalone	£40.00	£35.00		
ET301	Advanced Folio Standalone For Master Compact 3.5in drive	£40.00	£35.00		
			Goods Sub Total		
			P&P (£2.50 for orders under £50)		
			VAT at Standard Rate (17.5 percent)		
			Total to Pay		

* Runs on BBC Model B, B+, and Master 128 computers with 5.25in disc drive.

ORDER FORM FOR A3000/ARCHIMEDES USERS

Ref.	Title	Special Price	Qty	Value
ES200C	Desktop Folio Standalone PLUS Christmas Theme Pack	£90.00 £0.00		
ES200PC	Desktop Folio Primary Licence PLUS Christmas Theme Pack	£250.00 £0.00		
ES200SC	Desktop Folio Secondary Licence PLUS Christmas Theme Pack	£375.00 £0.00		
		Goods Sub Total		
		VAT at Standard Rate (17.5 percent)		
		Total to Pay		



MAKING TRACKS

DAVE LAWRENCE delves deep into the BAU archives, and unearths a couple of rough diamonds

Fate has decreed that *BAU* has offered me the reins of Pieces of Eight this month. I immediately suggested that we rerun an absolute eight-bit classic – *The Train Game* – which was the main attraction in January 1984.

Paul James, *BAU*'s harassed technical editor, delved into the back issue cupboard and surfaced five minutes later, covered in cobwebs, triumphantly holding aloft the January 1984 issue.

'There you are, good luck!', he said with a smirk – he'd already seen what lay in store on pages 91 to 114!

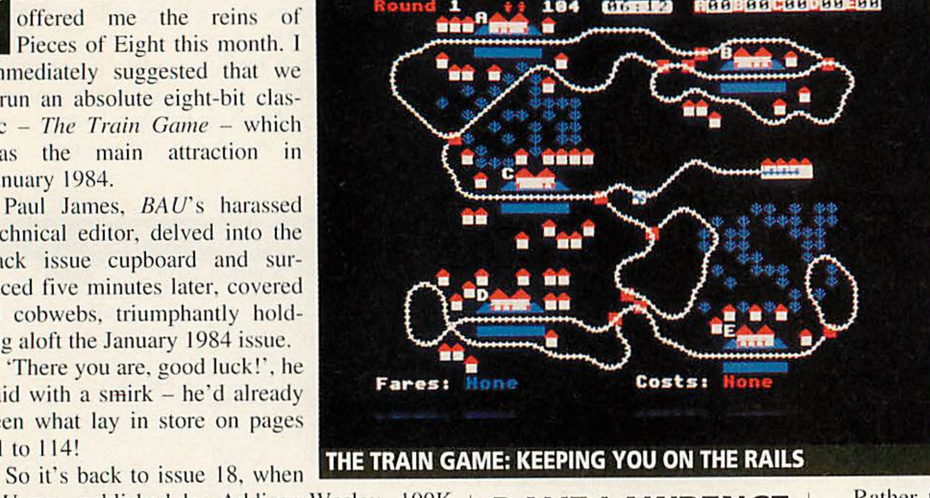
So it's back to issue 18, when *AU* was published by Addison-Wesley, 100K disc drives were £270 a shot and *3D Bomb Alley* was top of the chart.

The Train Game was written by **Peter Balch** to demonstrate that fun arcade games could be written in Basic. Here's some background from January 1984:

'Writing action-packed arcade games in Basic poses problems – objects have to move fast, you want lots to be happening and you need to know when things collide.

'Machine code gives plenty of time to do all the calculations, but Basic runs 100 or more times slower and is bulkier into the bargain. So you're limited in both time and space.

'One solution is have lots of active objects, but few moving at any time. A pinball simulation is a good example. You can have lots of active objects – the ball, bumpers, flippers and so on – but only the ball is constantly moving. In *The Train Game* we have the points, the passengers and the trains waiting in the engine shed, but only four trains are allowed on the track at once.



THE TRAIN GAME: KEEPING YOU ON THE RAILS

'Next, don't print characters at the graphics cursor (VDU 5) or use plotting, as both are very slow. For speed, use nothing but characters printed in the normal locations.

'Finally, there's the problems of knowing whether two objects have collided. You could search a table of object locations to see whether they have come close, but that would take forever. Similarly, using the POINT command is slow. Instead, keep a separate 'map' of the screen in an array. Every time you move an object into a new square you can look at the map to see if the square is occupied.'

Rather than merely reprinting the game line for line, we all agreed that it needed considerable tidying up. The original program was 267 lines long, with many multi-statement lines, meaningless variable names and possibly the worst case of spaghetti coding ever – more GOTOs and GOSUBs than you could wave a mouse pointer at! But it worked, and it worked very well; after all, most programs in 1984 were untidy. A few features in the game seemed a little odd, so these were scheduled for the chop, while a number of new facilities were pencilled in for inclusion in the 1991 remix.

My first job was to get the original game up and running. We didn't have monthly discs in 1984 so Paul, a chronic workaholic, did offer to type the whole thing in. From what we can remember though, the original listing was full of bugs and there were numerous corrections in the subsequent issues, so this wasn't a pleasant prospect. However, rifling through a stack of old discs, we discovered a fully working version.

After half an hour or so of fiddling around, the game eventually finished drawing the game board. Hmmm, not a good start! In fact, it didn't take too long to realise the code was going to need a complete rewrite. I still can't work out what I=INT(1.6+Y/8.7) is meant to be doing. The original game was an amazingly tight fit, so all recoding was done under *65Tube* on an Arc. The track drawing was considerably speeded up, the main game loop tidied up and various modifications made.

An evening later and not a GOTO in sight – my new version was neater, faster, had more features and was nearly 4K too long to fit into a Beeb – the main problem being that half the program dealt with track laying, and was only needed once per game. This could really be discarded once the track had been drawn as none of it was needed by the main game. I toyed briefly with overlays but could not come up with a wholly satisfactory solution.

In the end I decided on writing the track laying routine in machine code. This would kill two birds with one stone. Firstly it would relieve the memory problem, secondly tracks could be drawn fast enough to allow a new one to be designed for each level adding an extra twist to the game. Just when I thought everything was going well, I found that this version was still too long to fit in a Beeb.

As the main game was still in Basic, I couldn't use any of the language workspace (from &400 to &7FF) – the normal trick when writing games. So short of putting the game into boring Mode 4, yukky boring B&W, there was little I could do except take a deep breath and write the whole game in code. I realised this rather went against the original intent of the game, but the memory freed could be put to good use and all sorts of extra bells and whistles (pardon the allusion) could be included. I hope that you, and Peter himself for that matter, approve of what I've done. My version works on all machines and emulators, shadow memory and 6502 second processors, just like the original program.

The Train Game

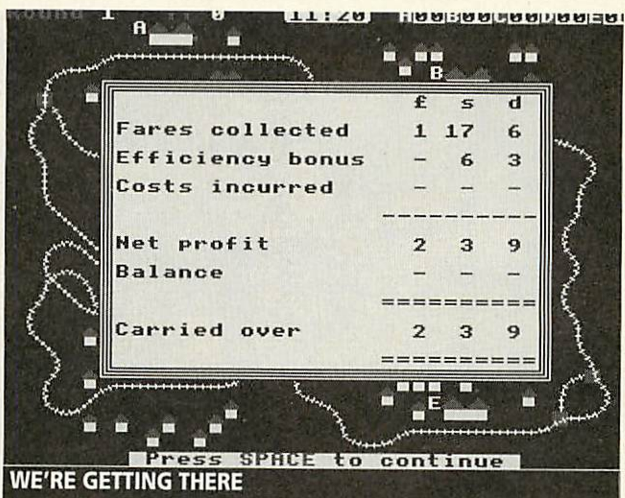
Original version by Peter Balch
1991 remix by Dave Lawrence
(C) 1984 and 1991 BAU

Today's Highest Profits

	-- Controller --	£	s	d
1	Rick Mansworth	25	2	9
2	Colin Dale	17	12	–
3	Russell Square	10	–	11
4	Warren Street	9	3	3
5	Stan More	8	–	–
6	Walt Hamstow	4	15	6
7	Brent Cross	1	19	5
8	Reg Entspark	–	18	7

Press SPACE to start game

TIME FOR A HUGE PAY RISE?



WE'RE GETTING THERE

GETTING UP STEAM

There are 10 listings, Core, Part1-8 and Spooler, in *The Train Game*. Spooler should be run first to create a number of spool files needed by the main assembly process. As with all large machine code programs, the game needs to be assembled in sections.

The technique used here involves a core program, Core, and a number of source code modules, the various Part files. Core sets PAGE to &3000 to allow the object code to be assembled beneath it, initialises all the constants used by the game and then appends each Part file in turn onto the end of itself. The end of the current Basic program is stored in the pseudo-variable TOP and if another Basic program is loaded at TOP-2 it is tacked on the end. The final program will not be renumbered. This has no effect on the execution – you'll just have some duplicate line numbers.

To perform the actual assembly, a GOSUB to the last line of Core is needed. I criticise GOSUBs, then I go and use one myself! I did try having a PROCassemble in the core loop, and DEF PROCassemble in each source code module, but Basic didn't like that, so I was stuck with the GOSUB.

After each module has been assembled twice, meaning passes 0 and 2, various data tables are calculated and the code is saved. There are two main advantages in using this method of assembly; firstly there is no extra code needed in each module apart from a RETURN at the end, and modules can use any macros, that is PROCs and FNs, defined in the Core program for example, the PROCvdus.

Each level starts by drawing a track. Tracks are laid from each end of every station and from the engine shed. Up to three extra tracks are laid on later levels. The track grows from its free end until it hits something. If it hits another piece of track at a reasonable angle it will form points and is considered complete. Otherwise it will back up by an amount depending on how many times it has hit something recently.

When the track is complete a check is made to see if it is possible to reach all five stations from the engine shed. If the track is not satisfactory a new one will be designed. This is one of my added features. Another addition allows you to slow down the track laying by pressing SPACE. This is solely so you can see how clever Peter's original algorithm is – my machine code version is too fast to sit and watch! At the start of the game, you have four engines in the shed. On the first four levels, you only control one. On the second four two and so on, up to the maximum of four. In Peter's original, the game ran too slowly with more than four. Trains emerging from the shed will wait a short while before sounding their whistle and moving off.

Trains can crash into each other, the engine shed, or points which are set against them.

Whenever you crash a train, another will emerge from the shed – if you haven't got any more left, the new one is a demon, as I'll explain later. The game can end in a number of ways, one of which, fairly obviously, is if you run out of steam trains.

You can control only one train at a time – selected with SPACE. The train you've selected is illuminated, and you can stop and start it by pressing S. After a short while, a stationary train sounds its whistle and starts by itself. R can be used to reverse the current train.

In the original game pressing / turned a train red which meant that it would change the next points just before it got to them. This seemed a very difficult method of playing the game, so in my version you can press 1, 2 or 3 to change the first, second or third set of points in front of the current train.

BANISHING DEMONS

Demon trains are red and are not under your control. They bounce off the engine shed and each other, but will plough mercilessly into your trains. Points set against demons have no effect – they simply change them in their favour! Your only defence against these irresponsible machines, is that you can derail a demon by changing a set of points as it crosses them. You'll get no reward for doing this, and a new demon will emerge from the shed immediately, but it may buy you a little time.

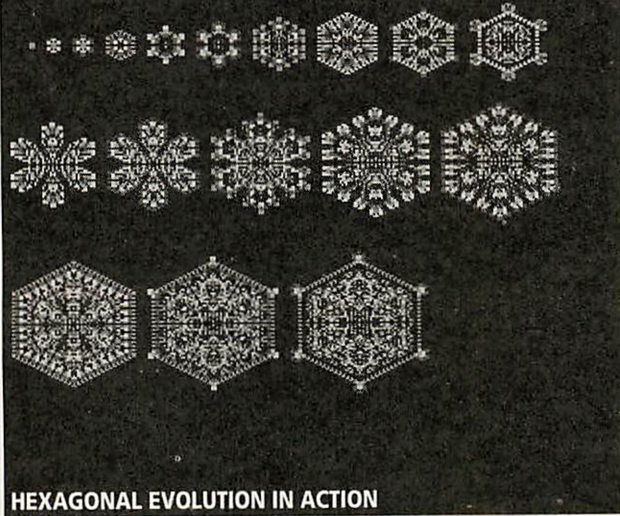
The object of the game is to deliver passengers. At the start of each round there are passengers waiting at each station – the total is displayed at the top of the screen. Every passenger wants to go somewhere else and will pay only when they get there. Passengers conveniently stand on the platform in order – those for A on the left, E on the right.

Once a train is stopped at a station, there are a number of keys that control passenger movement, all of which are my additions. In general you'll only need TAB. This makes everyone on your train wishing to alight at this station get off and pay their fare of sixpence, and also makes everyone standing on the platform get on to the train. The indicator shown in the top right hand corner of the screen shows you how many passengers are on the current train for the various destinations.

A coach can hold only 99 passengers so on later rounds some may be left waiting at the station – you'll have to go back for them. The other passenger keys may seem a little odd at first; F0 makes all passengers on a platform get on, but none will get off. F1-F5 are also get on keys, but only those passengers going to A (for F1), B (for F2) and so on, will get on. SHIFT plus F0 or F1-F5 are similarly getting off keys. Be warned though, that if you tell people to get off at any station except their destination, you'll have to pay them 1d compensation! More advanced players may find that on later levels these keys are liable to prove very useful when controlling more than one train.

Each round starts at 6 am. If you fail to deliver everyone by midnight, the game is over. However, if everyone is delivered by midday, each will pay 1d extra! Crashing a train will cost you £1 4s 10d plus 4d compensation for each passenger you are carrying.

At the end of each round, your fares collected are added to your score and your costs deducted. If you have made a profit, you are allowed to proceed to the next round. Bonus trains are awarded as your score exceeds certain values. Pressing P will pause the game and CTRL-ESC will quit.


HEXAGONAL EVOLUTION IN ACTION



SNOWFLAKES MADE SIMPLE

BATTLE OF THE HEXES

Not content with a complete rewrite of *The Train Game*, Paul also asked me to fill this little space at the end of the page. So I thought I might as well write a little bit about **Malcolm Banthorpe**'s hexagonal *Life* which also appeared in issue 18. Malcolm's program uses slightly modified versions of the original *Life* rules to deal with a hexagonal grid and produces some very snowflakey designs.

There are two programs. *HexLife1* shows a sequence of generations on screen. There are three different initial patterns built in – simply deREM the relevant DEF PROCdesignS. Alternatively, try adding one of your own. *HexLife2* ignores third generation cells and displays a large version of one generation at once. Odd things happen after about level 18, as the program starts Life-ing the generation number displayed at the top of the screen!

Both of these two *Hexlife* programs are fairly slow – they will just barely run at an acceptable speed on an Archimedes fitted with an Arm 3 upgrade, so you people out there may care to set your minds to it and send in 6502 or Arm versions of *Hexlife*. Those that we deem good enough will be assured of a place in our regular *Info column.



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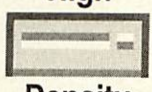
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High



Density

High Density Interface

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Price : £42.50 Availability : October 1991

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Is the professional desktop dissassembler for the Archimedes. Ideal for both the novice and experienced user. Contains many innovative and useful features such as user colour coding of instructions, support for all ARM assembler instructions and the dynamic allocation of memory to cater for programs of all sizes.

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HYPERMEDIUM

The second part of our continuing series that tells how to get the most out of

Hypermedia is a hot subject these days. At its simplest level Oak Solutions' *Genesis 2* hypermedia package, which we reviewed in the May issue, permits text, graphic images and sounds to be combined to produce a multimedia database while at its highest level its scripting language permits specific applications to be written; the possible range of applications is almost limitless.

These features are similar to Hypercard on the Apple Macintosh; a hypermedia system which has spawned huge numbers of educational applications in the USA and is beginning to do the same in this country. *Genesis* differs from wordprocessors, art packages and so on by being able to mix media, presenting information in a variety of ways.

In a nut shell, *Genesis* provides a framework for creating pages of information which can be linked together to form an application. From simple beginnings quite complex and sophisticated applications can be created – a system which grows as your confidence and familiarity grows. In this, the second article in the Stepping Up series we investigate just how easy it is to get started with this powerful software.

IN THE BEGINNING

Genesis 2 comprises five essential programs:

● *!Genesis*, the *Genesis 2* editor, used to create and edit applications

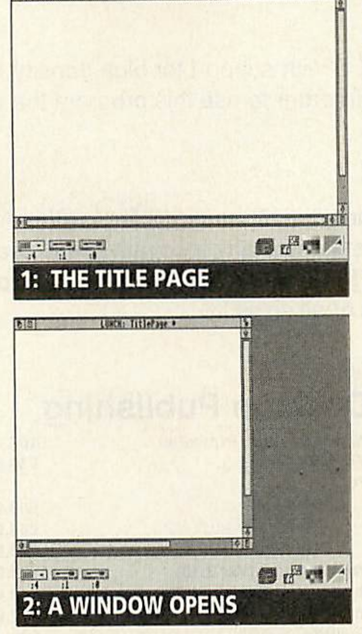
● *!Genfiler* for displaying the resources, pages, and objects associated with each application

● *!Genlib*, a library of drawings, sprites and so on, for use in the applications you create

● *!Browser* which allows you to access existing applications, but not to alter them, and *!GI_to_GII*, a utility which converts *Genesis 1* applications to *Genesis 2* format

● *!Genesis*, the heart of the suite, where applications are created

However, the first thing is to copy all the files from the three discs in the box onto a set of three formatted backup discs or into a directory on a hard disc if one is present. This is done in the normal Risc OS manner by creating a new directory, opening a window on it and dragging the files into the directory viewer. If you have made back-up floppies, put the Editor disc into the drive, open the directory viewer and click on the *!Genesis* icon. Once installed on the icon bar you are ready to create an application.



1: THE TITLE PAGE

2: A WINDOW OPENS

3: FOUR NEW FRAMES

The basic units of information in *Genesis* are known as resource frames. The resource frames available are quite extensive:

● **Text frames** – these permit a variety of colour, size, styles and typefaces

● **Draw frames** – *Draw* files scaled to the frame's dimensions

● **Sprite frames** – sprite images which may be scaled to maintain their correct proportions

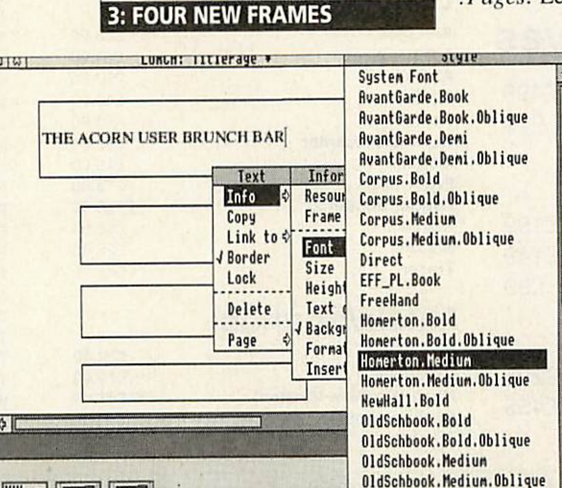
● **Euclid frames** – these handle objects generated using Ace Computing's *Euclid*, which can be viewed from any position and have their zoom factor and lighting effects altered

● **Mogul film frames** – displays animated sequences, created using Ace Computing's *Mogul*, *Tween* and *Splice*, which can be stopped, started and single-stepped through the sequence

● **Music frames** – these play *Maestro* music files. If the frame is empty a music icon fills the frame to indicate the frame's contents. If the frame is not empty, the music file is added to the frame invisibly.

● **Sound sample frames** – these permit captured digitised sounds to be played, and they can be added to both empty and occupied frames in the same manner as *Maestro* music files

Before beginning ensure that you have a blank, formatted disc available to store your *Genesis 2* application on, or a directory created on your hard disc. Clicking the Menu button over the *Genesis 2* icon brings up a dialogue box which invites you to name your application *!Pages*. Let's call this one *!Lunch*, so delete the letters up to the ! (this character is needed to tell the desktop that the file is an application), and type in Lunch so that *Lunch* is the new title. Using the Select button, drag the file icon to your working disc directory viewer and drop it in. *Genesis 2* now knows where to assemble all the information relating to *Lunch*.



4: ENTERING TEXT

The blank window which fills the screen is the title page shown in Figure 1. This can be resized by dragging the adjust-size icon in the bottom right-hand corner of the window in the normal manner. Similarly, the title bar can be used to drag the window around the screen area. Once you have a window like Figure 2, the next

IS THE MESSAGE

your software. **CHRIS DRAGE** explains hypermedia by going back to Genesis

thing is to create some frames. Point to where you want the top left-hand corner of the frame, hold the Select button and pull. The bottom right-hand corner of the dotted rectangle so formed follows the arrow round the screen until you release the mouse button. Then a black rectangle will be drawn marking the border of the newly created frame. Using this technique, create four such frames on the title page, as in Figure 3. The size and position doesn't really matter at this stage as all the frames can be moved and resized using the Select or Adjust buttons – very much like using *Ovation* or *Impression*.

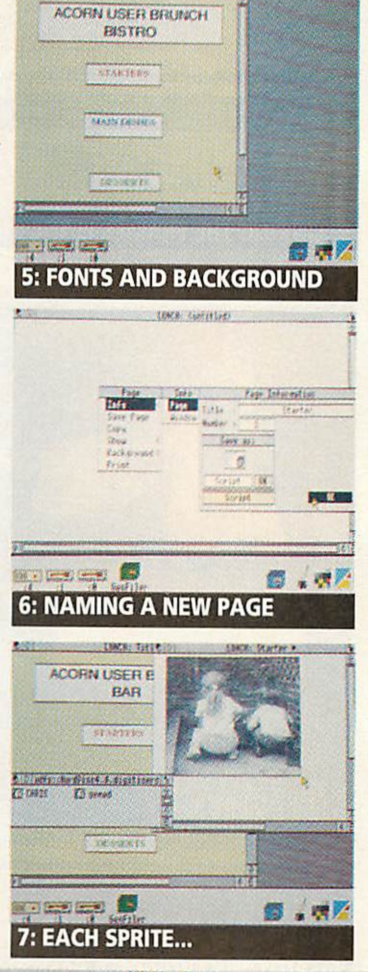
GET IT IN WRITING

Now enter some text. Click Select inside a frame to get the text caret, and then type some text, as in Figure 4, into each of the frames in turn. Click the Menu button in a frame to open the text menu, and enter the Info submenu where you will find Font, Size, Height, Colour and Format, the five items you will frequently use to obtain the textual presentation you require. In the first frame select Font Homerton.Medium, Size 20 points and Format Centred.

Carry out a similar procedure with the other frames, choosing a suitable font, colour and size to arrive at a page similar in appearance to Figure 5. At this stage it might help to emphasise what is going on by giving the title page a background colour. Click the Menu button anywhere on the title page to bring up the Options menu. Go into the Background Colour submenu to produce a list of available colours and choose colour 12 – light yellow. The title page will now be shown in that colour, the frames remaining white.

So far so good, but all we have really done is to create a DTP page. However, where *Genesis 2* is so powerful is in its ability to link pages. This concept is analogous to the principle behind the Teletext service. There too pages are linked and you find your way round by entering a page number, or, if you have Fastext, by selecting one of four coloured buttons on your TV handset. *Genesis 2* is similar but offers a far more sophisticated linkage system with a range of buttons and devices.

To create another page simply click Menu on the *Genesis* icon, and select Create page to display another blank page. This page will require a name, for example Starter, named, as seen in Figure 6, in the Page Information dialogue box, accessed by clicking the Menu button in the page. Create a frame in this new page and drag a previously created sprite into it. *Genesis 2* provides a number of such images on the resources disc, which can be accessed by clicking Menu over the *Genesis 2* icon and selecting Show – *!Genlib* bringing up a directory viewer of all the resources available to you on disc. Draw a frame for each sprite on the new page, as in Figures 7 and 8. Then create several text frames to complete the page. From the Text Menu you may deselect the borders round any of the frames to improve their appearance.



5: FONTS AND BACKGROUND

6: NAMING A NEW PAGE

7: EACH SPRITE...

At this stage it is appropriate to suggest that, before embarking on any new *Genesis 2* application, it would be wise to first plan it thoroughly on paper, so that you have a clear idea of the structure it will take and the resources you will need. In this way the application is less likely to grow, and possibly overflow the anticipated memory overheads.

The illustration shows the route-map for an existing *Genesis 2* educational application, *!MapIT* by HM Associates, which is sold with the *!Browser* utility to enable you to run it even without *Genesis 2*. Such an application has obvious relevance to any reader interested in the IT component of the National Curriculum but, in addition, by analysing its structure in *Genesis 2* it can also teach you an awful lot about how to design and assemble such a presentation.



8: ...NEEDS ITS OWN FRAME

Having created your two pages all that remains now is to link them together. To create the link it is necessary to point to a frame, using the example of the Starters frame on the Title Page, click on the Menu and select Link to..., as seen in Figure 9.

A window displaying the frame linking tools is then opened, from which a tool can be chosen. Probably the most commonly used tool is the one labelled Double click. To establish the link use the Select button to drag this tool and drop it onto the Starters page.

At this point it is sensible to save your work using the Save page option found in the Page Menu.

Changes and alterations can still be made to either page, but do remember to save the pages again afterwards.

To see the link in action close the Starter page by clicking on the close-page icon in the top left-hand corner in the normal manner, leaving just the TitlePage. If you then double click on the Select button on the Starters frame the second page will appear, overlaying the TitlePage. Alternatively if you double cl'ck the Adjust button, the TitlePage is removed and replaced by the second page. Now try and create and link two more pages to be activated from the Main Dishes and Desserts frames. If these new pages are to share the same format as the second page then a quick way of producing them is to choose Copy on the Page Menu of this second page, adding two exact copies which can then be edited and linked to the frames on the TitlePage.

Once these pages are created the final thing to do now is to provide a more elegant means of returning to the title page other than having to remove the other pages.

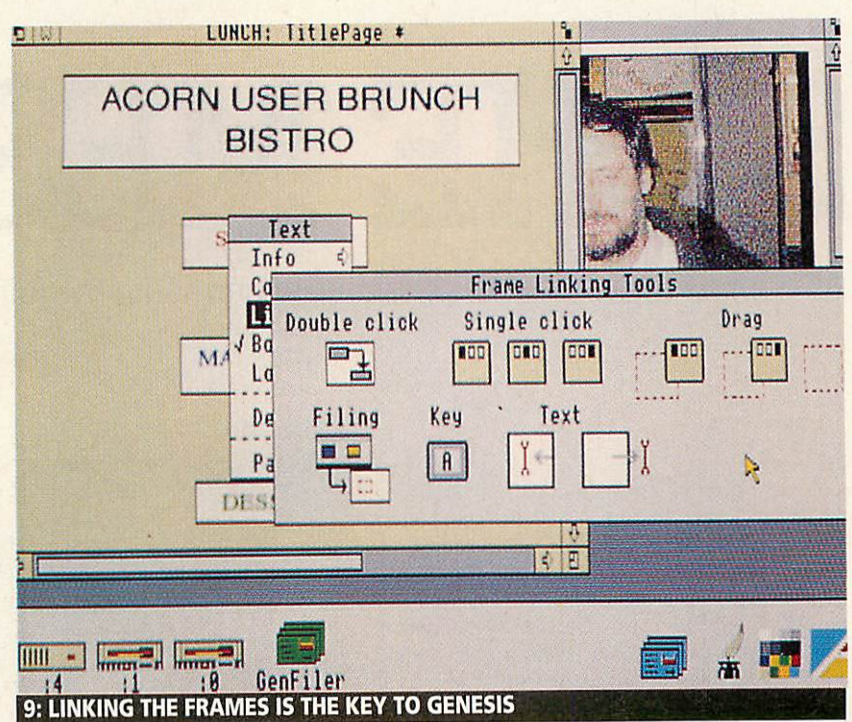
Genesis 2 provides many advanced operations by means of clicking on buttons, which are in effect pre-defined parcels of operations. which have a particular effect when you drop them onto a page. For example, it might add a ready-made frame, complete with special actions, at the position in which it is dropped on the page, or it may alter the window definition or turn off all the window icons. Buttons are very simple to use; just drag the relevant button icon from a *!Genlib* directory viewer and drop onto the page. For the purpose of this demonstration I used the Previous button icon dropped on to the page, rescaled it and produced links back to the Starters frame on the TitlePage, Figure 10. Clicking on the Previous button on the Starter page brings up the title page.

In this introduction to *Genesis 2* only the basic principles of creating an application have been covered, but I hope it will have dispelled any doubts you may have had about using the program. Using the same techniques as above you can go on to add more pages, more data and a more involved linking system – the scope of possible applications is enormous. Throughout the UK there are some very interesting and complex *Genesis 2* based projects underway.

Among these, one stands out in particular – the *Battle of the Somme* interactive video application being developed at Netherhall School, Cambridge in consultation with the Imperial War Museum. Involving a huge number of cross curricular skills, the *Somme* application promises to become the most comprehensive *Genesis 2* application yet, with a large range of curriculum support materials which aim to make IT truly interactive.

Alastair Wells, the *Somme*'s major contributor and developer, said that 'The real joy of using *G nesis 2* is that it is kind to the user – if you have made a mistake there is always a solution and an easy edit routine. This coupled with the Risc OS environment ensures that the compilation stage is a real pleasure.'

Now it's your turn. If you are currently developing any serious *Genesis 2* applications let me know by writing to me at *BAU*, enclosing a description.



9: LINKING THE FRAMES IS THE KEY TO GENESIS



10: BUTTONS PROVIDE A FAST WAY TO MAKE LINKS

PRODUCT DETAILS

- **Product:** Genesis 2
- **Description:** Hypermedia software package
- **Supplier:** Oak Solutions, Cross Park House, Low, Green, Rawdon, Leeds LS19 6HA. Tel: (0532) 502615.
- **Machines:** Archimedes A400 series, A310 and A3000
- **Price:** £130.00. Schools price: £99.00. Upgrade from Genesis 1: £34.95, provided that it was not acquired as part of a Learning Curve package supplied on purchase of an Arc

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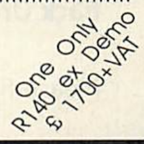
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X Window System R11.4

This new software package, developed in association with Acorn Computers, converts a RISC OS based Archimedes into an X Terminal. The software will allow communication with X clients over Ethernet or Econet.

X Software	£199
Complete X Terminals from	£1550

Archimedes upgrades

30MHz ARM 3 Upgrade	£430
A440/R140 4-8MB Memory Upgrade	£675
External SCSI 200MB H/D + Acorn SCSI Card	£1250
External SCSI 750MB H/D + Acorn SCSI Card	£1900
External 150MByte SCSI Tape Drive	£850

Transputer Systems

Gnome Computers offers a complete range of transputer boards to fit into either RISC OS or RISC iX based Archimedes machines. Prices start at £1385 for a single 10 MIP, 2 MFLOP transputer system including a parallel FORTRAN-77, C, Pascal, Modula-2 or Occam compiler.

UNIX Specialists



Program	Page	BBC B B+	B+/ 128	Master 128	Master Compact	Electron	6502SP/ Turbo	ADFS	Econet	Shadow Ram	Archimedes/ A3000	Monthly disc
★Info	49											
Info 1 - 2								■	■		■	■
Info 3		■	■	■	■	■	■	■	■	■		■
Info 4								■	■		■	■
Info 5								■	■		■	■
Info 6 - 8		■	■	■	■	■	■	■	■			■
Info 9		■	■	■	■			■	■			■
Info 10						■		■				■
Info 11		■	■	■	■	■	■	■	■	■	■	■
Info 12 - 17								■	■		■	■
Font Designer	77		■	■	■	■	■	■				■
Pieces of Eight	90											
Po8 1 - Po8 10		■	■	■	■	■	■	■	■			■
Po8 11 - Po8 12		■	■	■	■	■	■	■	■	■	■	■

★Info

Listing 1

```
10 REM >Links (Infol)
20 REM By David Williams
30 REM For Archimedes only
40 REM (C) BAU October 1991
50 :
60 ON ERROR MODE 0:REPORT:PRINT " at line ";ERL:GOTO 150
70 MODE 15
80 MODE 12:OFF
90 PROCinit
100 REPEAT
110 PROCalter
120 IF NOT end PROCgame
130 UNTIL end
140 MODE 0
150 *FX229,0
160 *FX4,0
170 *FX225,1
180 END
190 :
200 DEF PROCinit
210 MOUSE TO 640,512
220 CLOSE #0
230 maxpoints=100
240 maxlinks=400
250 DIM xpos(maxpoints),ypos(maxpoints)
260 DIM xvel(maxpoints),yvel(maxpoints)
270 DIM type(maxpoints),link(maxlinks,2)
280 DIM tautness(maxlinks)
290 DIM xpos2(maxpoints),ypos2(maxpoints)
300 DIM xvel2(maxpoints),yvel2(maxpoints)
310 DIM link2(maxlinks,2)
320 DIM type$(2)
330 Anchor=1
340 Floater=2
350 type$(Anchor)="Anchor"
360 type$(Floater)="Floater"
370 xpos(1)=640
380 ypos(1)=700
390 xvel()=0:yvel()=0
400 type()=Floater
410 angle=0
420 gravity=50
430 points=1
440 links=0
450 tautness=25
460 radius=12
470 end=FALSE
480 bouncing=TRUE
490 snapping=TRUE
500 name$="NewStruct"
510 *FX4,1
520 *FX229,1
530 *FX225,140
531 *FX9,3
532 *FX10,3
540 *POINTER
550 PROCkeepsafe
560 ENDPROC
570 :
580 DEF PROCalter
590 esc=INKEY-113
600 MOUSE ON
610 CLS
620 PROCdraw
630 REPEAT
640 MOUSE x,y,b
650 UNTIL b=0
660 done=FALSE
670 og=-1:ot=-1
680 mouse=FALSE
690 REPEAT
700 IF og<>gravity OR ot<>tautness THEN
710 PROCinfo
720 og=gravity
730 ot=tautness
740 ENDIF
750 MOUSE x,y,b
760 shift=INKEY-1
770 IF shift add=5 ELSE add=1
780 IF mouse THEN
790 IF b=0 mouse=FALSE
800 ELSE
810 IF b>0 mouse=TRUE
820 IF INKEY-1 THEN
830 IF b=1 OR b=4 PROCdeletepoint
840 IF b=2 PROCdeletelink
850 ELSE
860 IF b=4 PROCaddpoint(x,y,Floater)
870 IF b=1 PROCaddpoint(x,y,Anchor)
880 IF b=2 PROCaddlink
890 ENDIF
900 ENDIF
910 key$=INKEY$(0)
920 CASE key$ OF
930 WHEN CHR$136:tautness-=add
940 WHEN CHR$137:tautness+=add
950 WHEN CHR$138:gravity-=add
960 WHEN CHR$139:gravity+=add
970 WHEN CHR$142:PROCload
980 WHEN CHR$143:PROCsave
990 WHEN "R","r":PROCreset
1000 WHEN "B","b":bouncing=NOT bouncing:PROCinfo
1010 WHEN "S","s":snapping=NOT snapping:PROCinfo
1020 WHEN CHR$27 :IF NOT esc done=TRUE:end=TRUE
1030 WHEN " "    :done=TRUE
1040 ENDCASE
1050 IF esc AND NOTINKEY-113 esc=FALSE
1060 UNTIL done
1070 MOUSE OFF
1080 PROCkeepsafe
1090 ENDPROC
1100 :
1110 DEF PROCkeepsafe
1120 xpos2()=xpos():ypos2()=ypos()
1130 xvel2()=xvel():yvel2()=yvel()
1140 link2()=link()
1150 points2=points
1160 links2=links
1170 ENDPROC
1180 :
1190 DEF PROCreset
1200 CLS
1210 xpos()=xpos2():ypos()=ypos2()
1220 xvel()=xvel2():yvel()=yvel2()
1230 link()=link2()
1240 points=points2
1250 links=links2
1260 PROCdraw
1270 PROCinfo
1280 ENDPROC
1290 :
1300 DEF PROCdraw
1310 GCOL 3
1320 MOVE xpos(1)+30*SINRAD(angle+140),ypos(1)+30*COSRAD(angle+140)
1330 MOVE xpos(1),ypos(1)
1340 PLOT 85,xpos(1)+30*SINRAD(angle),ypos(1)+30*COSRAD(angle)
1350 PLOT 85,xpos(1)+30*SINRAD(angle-140),ypos(1)+30*COSRAD(angle-140)
1360 IF points>1 THEN
1370 FOR point=2 TO points
1380 GCOL type(point)
1390 CIRCLE FILL xpos(point),ypos(point),radius
1400 NEXT
1410 ENDIF
1420 IF links<>0 THEN
1430 GCOL 7
1440 FOR link=1 TO links
1450 LINE xpos(link(link,0)),ypos(link(link,0)),xpos(link(link,1)),ypos(link(link,1))
1460 NEXT
1470 ENDIF
1480 ENDPROC
1490 :
1500 DEF PROCinfo
1510 VDU 30
1520 PRINT"Points: ";FNpad(points,3);" Links: ";FNpad(links,3);"  Gravity: ";
1530 IF gravity<0 PRINT"-"; ELSE PRINT" ";
1540 PRINT ;ABSgravity DIV 100;".";RIGHT$("00"+STR$(ABSgravity MOD 100),2);
1550 PRINT"   Tautness:";FNpad(tautness,5);"  Bounce ";
1560 IF bouncing PRINT"on "; ELSE PRINT "off";
1570 PRINT"  Snap ";
1580 IF snapping PRINT"on "; ELSE PRINT "off";
1590 ENDPROC
1600 :
1610 DEF FNpad(val,pad)
1620 =RIGHT$(STRING$(pad," ")+STR$val,pad)
1630 :
1640 DEF PROCaddpoint(x,y,type)
1650 IF points=maxpoints ENDPROC
1660 points+=1
1670 xpos(points)=x
1680 ypos(points)=y
1690 xvel(points)=0
1700 yvel(points)=0
1710 type(points)=type
1720 PROCdraw
1730 PROCinfo
1740 ENDPROC
1750 :
1760 DEF PROCaddlink
1770 IF links=maxlinks ENDPROC
1780 from=FNfindpoint(x,y)
1790 IF from<0 VDU 7:ENDPROC
1800 mouse=TRUE
1810 clicked=FALSE
1820 GCOL 3,7
1830 REPEAT
1840 MOUSE tx,ty,b
1850 LINE tx,ty,xpos(from),ypos(from)
1860 WAIT
1870 IF mouse THEN
1880 IF b=0 mouse=FALSE
1890 ELSE
1900 mouse=TRUE
1910 clicked=TRUE
1920 ENDIF
1930 LINE tx,ty,xpos(from),ypos(from)
1940 UNTIL clicked
1950 to=FNfindpoint(tx,ty)
1960 IF to<0 OR to=from VDU 7:ENDPROC
1970 links+=1
1980 link(links,0)=from
1990 link(links,1)=to
2000 link(links,2)=SQR((xpos(from)-xpos(to))^2+(ypos(from)-ypos(to))^2)
2010 tautness(links)=tautness
2020 PROCdraw
2030 PROCinfo
2040 ENDPROC
2050 :
2060 DEF FNfindpoint(px,py)
2070 IF POINT(px,py)=0 THEN =-1
2080 mindist=1E38:best=-1
2090 FOR point=1 TO points
2100 dist=SQR((px-xpos(point))^2+(py-ypos(point))^2)
2110 IF dist<mindist mindist=dist:best=point
2120 NEXT
2130 IF mindist>radius THEN =-1
2140 =best
2150 :
2160 DEF PROCgame
2170 bank=1
2180 REPEAT
2190 WAIT
2200 SYS 6,112,bank
2210 SYS 6,113,3-bank
2220 CLS
2230 bank=3-bank
2240 PROCdraw
2250 PROCinfo
2260 link=0
2270 WHILE link<links
2280 link+=1
2290 point1=link(link,0)
2300 point2=link(link,1)
2310 dx=xpos(point1)-xpos(point2)
2320 dy=ypos(point1)-ypos(point2)
2330 dist=SQR(dx^2+dy^2)
2340 force=tautness(link)*(link(link,2)-dist)/link(link,2)/dist*.9
2350 IF force<-0.05 AND snapping PROCsnap(point1,point2)
2360 IF type(point1)=Floater THEN
2370 xvel(point1)+=dx*force
2380 yvel(point1)+=dy*force
2390 ENDIF
2400 IF type(point2)=Floater THEN
2410 xvel(point2)-=dx*force
2420 yvel(point2)-=dy*force
2430 ENDIF
2440 ENDWHILE
2450 xpos()=xpos()+xvel()
2460 ypos()=ypos()+yvel()
2470 xvel()=xvel()/1.01
2480 yvel()=yvel()/1.01
2490 FOR point=1 TO points
2500 IF type(point)=Floater yvel(point)=yvel(point)-gravity/100
2510 IF ypos(point)<=0 THEN
2520 IF bouncing THEN
2530 ypos(point)=0
2540 yvel(point)=-yvel(point)*0.9
2550 xvel(point)=xvel(point)*0.7
2560 ELSE
2570 IF ypos(point)<0 ypos(point)=0:yvel(point)=0
2580 IF ypos(point)=0 xvel(point)=xvel(point)*0.7
2590 ENDIF
2600 ENDIF
2610 NEXT
2620 MOUSE x,y,b
2630 MOUSE TO 640,512
2640 angle+=(x-640)/2
2650 yvel(1)+=b*COSRAD(angle)
2660 xvel(1)+=b*SINRAD(angle)
2670 key$=INKEY$0
2680 shift=INKEY-1
2690 IF shift add=5 ELSE add=1
2700 CASE key$ OF
2710 WHEN CHR$138:gravity-=add
2720 WHEN CHR$139:gravity+=add
2730 WHEN "R","r":PROCretrieve(640,700)
2740 WHEN "B","b":bouncing=NOT bouncing
2750 WHEN "S","s":snapping=NOT snapping
```

```
2760 ENDCASE
2770 UNTIL key$=CHR$27
2780 SYS 6,112,1:SYS 6,113,1
2790 ENDPROC
2800 :
2810 DEF PROCretrieve(rx,ry)
2820 IF points>1 THEN
2830 FOR point=2 TO points
2840 xpos(point)=rx+xpos(point)-xpos(1)
2850 ypos(point)=ry+ypos(point)-ypos(1)
2860 NEXT
2870 ENDIF
2880 xpos(1)=rx
2890 ypos(1)=ry
2900 ENDPROC
2910 :
2920 DEF PROCsnap(point1,point2)
2930 REPEAT
2940 link=Ø
2950 changed=FALSE
2960 REPEAT
2970 link+=1
2980 IF (link(link,Ø)=point1 AND link(l
ink,1)=point2) OR (link(link,Ø)=point2 A
ND link(link,1)=point1) THEN
2990 link(link,Ø)=link(links,Ø)
3000 link(link,1)=link(links,1)
3010 link(link,2)=link(links,2)
3020 tautness(link)=tautness(links)
3030 links-=1
3040 changed=TRUE
3050 ENDIF
3060 UNTIL link>=links OR changed
3070 UNTIL changed=Ø OR links=Ø
3080 ENDPROC
3090 :
3100 DEF FNlinked(p1,p2)
3110 link=Ø
3120 linked=FALSE
3130 REPEAT
3140 link+=1
3150 IF (link(link,Ø)=p1 AND link(link,
1)=p2) OR (link(link,Ø)=p2 AND link(link
,1)=p1) linked=TRUE
3160 UNTIL link>=links OR linked
3170 =linked
3180 :
3190 DEF PROCdeletepoint
3200 togo=FNfindpoint(x,y)
3210 IF togo<=1 VDU 7:ENDPROC
3220 FOR link=Ø TO links
3230 IF link(link,Ø)=togo OR link(link,
1)=togo THEN
3240 link(link,Ø)=Ø
3250 link(link,1)=Ø
3260 tautness(link)=Ø
3270 ENDIF
3280 NEXT
3290 REPEAT
3300 changed=FALSE
3310 link=Ø
3320 REPEAT
3330 link+=1
3340 IF link(link,Ø)=Ø AND link(link,1)
=Ø AND links<>Ø THEN
3350 link(link,Ø)=link(links,Ø)
3360 link(link,1)=link(links,1)
3370 link(link,2)=link(links,2)
3380 tautness(link)=tautness(links)
3390 links-=1
3400 changed=TRUE
3410 ENDIF
3420 UNTIL link>=links OR changed
3430 UNTIL NOT changed OR links=Ø
3440 xpos(togo)=xpos(points)
3450 ypos(togo)=ypos(points)
3460 xvel(togo)=xvel(points)
3470 yvel(togo)=yvel(points)
3480 type(togo)=type(points)
3490 FOR link=1 TO links
3500 IF link(link,Ø)=points link(link,Ø
)=togo
3510 IF link(link,1)=points link(link,1
)=togo
3520 NEXT
3530 points-=1
3540 CLS
3550 PROCdraw
3560 PROCinfo
3570 ENDPROC
3580 :
3590 DEF PROCdeletelink
3600 togo1=FNfindpoint(x,y)
3610 IF togo1<Ø VDU 7:ENDPROC
3620 GCOL 3,8
3630 old=FALSE
3640 REPEAT
3650 MOUSE x,y,b
3660 togo2=FNfindpoint(x,y)
3670 IF old THEN
3680 LINE xpos(togo1),ypos(togo1),oldx,
oldy
3690 old=FALSE
3700 ENDIF
3710 IF togo2>Ø THEN
3720 IF FNlinked(togo1,togo2) THEN
3730 LINE xpos(togo1),ypos(togo1),xpos(
togo2),ypos(togo2)
3740 WAIT
3750 old=TRUE
3760 oldx=xpos(togo2)
3770 oldy=ypos(togo2)
3780 ENDIF
3790 ENDIF
3800 UNTIL b=Ø
3810 IF togo2>Ø THEN
3820 PROCsnap(togo1,togo2)
3830 CLS
3840 PROCdraw
3850 PROCinfo
3860 ENDIF
3870 ENDPROC
3880 :
3890 DEF FNinput(prompt$)
3900 PRINTTAB(Ø,Ø);SPC80
3910 PRINTTAB(Ø,Ø);"Enter filename to "
;prompt$;" [";name$;"] :";
3920 ON
3930 in=GET
3940 IF in<>27 THEN
3950 SYS 6,138,Ø,in
3960 INPUT""input$
3970 ENDIF
3980 PROCinfo
3990 OFF
4000 IF in=27 THEN =""
4010 IF input$="" THEN =name$
4020 =input$
4030 :
4040 DEF PROCload
4050 new$=FNinput("load")
4060 IF new$="" THEN ENDPROC
4070 file$=new$
4080 in=OPENIN(file$)
4090 points=VALFNmustbe("points")
4100 links=VALFNmustbe("links")
4110 tautness=VALFNmustbe("tautness")
4120 gravity=VALFNmustbe("gravity")
4130 snapping=(FNmustbe("snap")="on")
4140 bouncing=(FNmustbe("bounce")="on")
4150 FOR point=1 TO points
4160 info$=FNmustbe("point")
4170 xpos(point)=VALFNmid(info$,"(",","
)
4180 ypos(point)=VALFNmid(info$,",",")"
)
4190 xvel(point)=VALFNmid(info$,"(",","
)
4200 yvel(point)=VALFNmid(info$,",",")"
)
4210 type$=FNmid(info$,"(",")")
4220 CASE type$ OF
4230 WHEN type$(Anchor):type(point)=Anc
hor
4240 WHEN type$(Floater):type(point)=Fl
oater
4250 OTHERWISE:ERROR 1,"Unexpected '"+t
ype$+"'"
4260 ENDCASE
4270 NEXT
4280 IF links>Ø THEN
4290 FOR link=1 TO links
4300 info$=FNmustbe("link")
4310 link(link,Ø)=VALFNmid(info$,"(","-
")
4320 link(link,1)=VALFNmid(info$,"-",")
")
4330 link(link,2)=VALFNmid(info$,"(",")
")
4340 tautness(link)=VALFNmid(info$,"(",
")")
4350 NEXT
4360 ENDIF
4370 CLOSE #in
4380 CLS
4390 PROCdraw
4400 PROCinfo
4410 ENDPROC
4420 :
4430 DEF FNmustbe(str$)
4440 in$=GET$#in
4450 IF LEFT$(in$,LENstr$+1)<>str$+":"
ERROR 1,"Unexpected '"+in$+"'"
4460 pos=INSTR(in$,":")+1
4470 WHILE MID$(in$,pos,1)=" "
4480 pos+=1
4490 ENDWHILE
4500 =MID$(in$,pos)
4510 :
4520 DEF FNmid(RETURN a$,c1$,c2$)
4530 p1=INSTR(a$,c1$)
4540 p2=INSTR(a$,c2$,p1+1)
4550 IF p1=Ø OR p2=Ø ERROR 1,"Format er
ror"
4560 mid$=MID$(a$,p1+1,p2-p1-1)
4570 a$=MID$(a$,p2)
4580 =mid$
4590 :
4600 DEF PROCsave
4610 new$=FNinput("save")
4620 IF new$="" THEN ENDPROC
4630 file$=new$
4640 out=OPENOUT(file$)
4650 BPUT #out,"points:   "+STR$points
4660 BPUT #out,"links:    "+STR$links
4670 BPUT #out,"tautness: "+STR$tautnes
s
4680 BPUT #out,"gravity:  "+STR$gravity
4690 BPUT #out,"snap:     "+FNonoff(sna
pping)
4700 BPUT #out,"bounce:   "+FNonoff(bou
ncing)
4710 FOR point=1 TO points
4720 BPUT #out,"point:    ("+STR$xpos(p
oint)+","+STR$ypos(point)+") ("+STR$xvel
(point)+","+STR$yvel(point)+") ("+type$(
type(point))+")"
4730 NEXT
4740 IF links>Ø THEN
4750 FOR link=1 TO links
4760 BPUT #out,"link:     ("+STR$link(l
ink,Ø)+"-"+STR$link(link,1)+") ("+STR$li
nk(link,2)+") ("+STR$tautness(link)+")"
4770 NEXT
4780 ENDIF
4790 CLOSE #out
4800 ENDPROC
4810 :
4820 DEF FNonoff(flag)
4830 IF flag THEN ="on"
4840 ="off"
```

Listing 2

```
 10 REM >MakeDemo (Info2)
 20 REM By Dave Lawrence
 30 REM For Archimedes only
 40 REM (c) BAU October 1991
 50 :
 60 out=OPENOUT("DemoStruct")
 70 REPEAT
 80  READ a$
 90  IF a$<>"(end)" BPUT #out,a$
100 UNTIL a$="(end)"
110 CLOSE #out
120 END
130 :
140 DATA "points:   7"
150 DATA "links:    8"
160 DATA "tautness: 1"
170 DATA "gravity:  23"
180 DATA "snap:     off"
190 DATA "bounce:   on"
200 DATA "point:    (640,700) (Ø,Ø) (F
loater)"
210 DATA "point:    (529,620) (Ø,Ø) (F
loater)"
220 DATA "point:    (640,590) (Ø,Ø) (F
loater)"
230 DATA "point:    (775,614) (Ø,Ø) (F
loater)"
240 DATA "point:    (481,506) (Ø,Ø) (F
loater)"
250 DATA "point:    (631,428) (Ø,Ø) (F
loater)"
260 DATA "point:    (811,446) (Ø,Ø) (F
loater)"
270 DATA "link:     (5-2) (123.6931688
) (14)"
280 DATA "link:     (2-1) (136.8247054
) (14)"
290 DATA "link:     (1-4) (160.0656115
) (14)"
300 DATA "link:     (4-7) (171.8138528
) (14)"
310 DATA "link:     (6-3) (162.2498074
) (14)"
320 DATA "link:     (3-2) (114.9826074
) (14)"
330 DATA "link:     (3-4) (137.1167386
) (14)"
340 DATA "link:     (1-3) (110) (1)"
350 :
360 DATA (end)
```

Listing 3

```
 10 REM >Frond8 (Info3)
 20 REM By Dave Acton
 30 REM For BBC B/B+/M/C/E/!65Host
 40 REM (c) BAU October 1991
 50 :
 60 REPEAT
 70 INPUT"Which mode? (Ø, 1 or 2) "mod
e%
 80 UNTIL mode%>=Ø AND mode%<=2
 90 bpp%=2^mode%
100 ppb%=8/bpp%
110 colours%=2^bpp%
120 IF colours%=16 colours%=8
130 xres%=640/bpp%
140 MODE mode%
150 VDU 23;8202;Ø;Ø;Ø;
160 PROCcode
170 PROCdrawbase
180 PROCgrow
190 END
200 :
210 DEF PROCcode
220 screen%=&3000
230 DIM scrlo% 32,scrhi% 32
240 FOR i%=Ø TO 31
250 a%=screen%+640*i%
260 scrlo%?i%=a% MOD 256
270 scrhi%?i%=a% DIV 256
280 NEXT
290 c=&72
300 count=&73
310 addr=&74
320 temp=&76
330 temp2=&77
340 write=&78
350 x=&80
360 y=&84
370 DIM code% &300
380 FOR pass%=Ø TO 2 STEP 2
390 P%=code%
400 [OPT pass%
410 .go
420 LDY #Ø
430 LDA x
440 CLC
450 ADC c
460 STA count
470 LDA y
480 CMP #10
490 BCS loop
500 LDA #10
510 STA y
520 :
530 .loop
540 JSR calcaddr
550 STX temp2
560 LDA addr
570 STA write
580 LDA addr+1
590 STA write+1
600 INC y
610 JSR peek
620 BNE done
630 DEC y
640 DEC y
650 JSR peek
660 BNE done
670 INC y
680 LDA x
690 BNE nhx1
700 DEC x+1
710 :
720 .nhx1
730 DEC x
740 JSR peek
750 BNE done
760 LDA x
770 CLC
780 ADC #2
790 STA x
800 BCC nhx2
810 INC x+1
820 :
830 .nhx2
840 JSR peek
850 BNE done
860 LDA x
870 BNE nhx3
880 DEC x+1
890 :
900 .nhx3
910 DEC x
920 \JSR calcaddr
930 \LDA (addr),Y
940 \AND notmask,X
950 \STA (addr),Y
960 LDX count
970 LDA rand,X
980 INC count
990 TAX
1000 LDA x
1010 CLC
1020 ADC xtablo-1,X
1030 STA x
1040 LDA x+1
1050 ADC xtabhi-1,X
1060 STA x+1
1070 LDA y
1080 CLC
1090 ADC ytab-1,X
1100 STA y
1110 LDA x+1
1120 CMP #(xres%-10) DIV 256
1130 BCC notdone
1140 BNE out
1150 LDA x
1160 CMP #(xres%-10) MOD 256
1170 BCS out
1180 :
1190 .notdone
1200 LDA x+1
1210 BNE notdone2
1220 LDA x
1230 CMP #10
1240 BCC out
1250 :
1260 .notdone2
1270 LDA y
1280 CMP #10
1290 BCC out
1300 CMP #246
1310 BCS out
1320 JMP loop
1330 :
1340 .done
1350 LDA temp2
1360 TAX
1370 ORA c
1380 STA temp2
1390 LDA (write),Y
1400 AND notmask,X
1410 LDX temp2
1420 ORA coltab,X
1430 STA (write),Y
1440 :
1450 .out
1460 RTS
1470 :
1480 .xtablo
1490 EQUB 255
1500 EQUB 1
1510 EQUB Ø
1520 EQUB Ø
1530 :
1540 .xtabhi
1550 EQUB 255
1560 EQUB Ø
1570 EQUB Ø
1580 EQUB Ø
```

```
 1590 :
 1600 .ytab
 1610 EQUB Ø
 1620 EQUB Ø
 1630 EQUB 1
 1640 EQUB -1
 1650 :
 1660 .peek
 1670 JSR calcaddr
 1680 LDA (addr),Y
 1690 AND mask,X
 1700 RTS
 1710 :
 1720 .calcaddr
 1730 LDA y
 1740 LSR A
 1750 LSR A
 1760 LSR A
 1770 TAX
 1780 LDA y
 1790 AND #7
 1800 CLC
 1810 ADC scrlo%,X
 1820 STA addr
 1830 LDA scrhi%,X
 1840 ADC #Ø
 1850 STA addr+1
 1860 LDA x+1
 1870 STA temp
 1880 LDA x
 1890 AND #256-ppb%
 1900 ]
 1910 IF mode%>Ø THEN FOR it%=1 TO mode%
:[OPT pass%:ASL A:ROL temp:]:NEXT it%
 1920 [OPT pass%
 1930 CLC
 1940 ADC addr
 1950 STA addr
 1960 LDA addr+1
 1970 ADC temp
 1980 STA addr+1
 1990 LDA x
 2000 AND #ppb%-1
 2010 TAX
 2020 RTS
 2030 ]
 2040 mask=P%
 2050 P%=P%+ppb%
 2060 notmask=P%
 2070 P%=P%+ppb%
 2080 coltab=P%
 2090 P%=P%+16
 2100 rand=P%
 2110 NEXT pass%
 2120 FOR i%=Ø TO 255
 2130 IF RND(5)=5 THEN rand?i%=3 ELSE ra
nd?i%=RND(4)
 2140 NEXT
 2150 step%=2^ppb%
 2160 FOR i%=Ø TO colours%-1
 2170 byte%=Ø
 2180 FOR j%=Ø TO bpp%-1
 2190 IF (i% AND (2^j%))>Ø byte%=byte%+s
tep%^j%
 2200 NEXT
 2210 FOR s%=Ø TO ppb%-1
 2220 coltab?(ppb%*i%+s%)=byte%*2^(ppb%-
1-s%)
 2230 NEXT
 2240 NEXT
 2250 m%=Ø
 2260 FOR j%=Ø TO bpp%-1
 2270 m%=m%+step%^j%
 2280 NEXT
 2290 FOR i%=Ø TO ppb%-1
 2300 mask?i%=m%*2^(ppb%-1-i%)
 2310 notmask?i%=255-mask?i%
 2320 NEXT
 2330 ENDPROC
 2340 :
 2350 DEF PROCdrawbase
 2360 MOVE 40,40
 2370 DRAW 1199,40
 2380 ENDPROC
 2390 FOR i%=1 TO 10
 2400 PLOT 69,40+RND(1160),40
 2410 NEXT
 2420 ENDPROC
 2430 :
 2440 DEF PROCgrow
 2450 top%=220
 2460 col%=1
 2470 speed%=7*(2^mode%)
 2480 REPEAT
 2490 !x=RND(xres%-20)+10
 2500 ?y=top%
 2510 ?c=col%*ppb%
 2520 IF RND(1000)<speed% top%=top%-1
 2530 IF RND(1000)<2 col%=col%+1:IF col%
=colours% col%=1
 2540 CALL go
 2550 UNTIL top%=40
 2560 ENDPROC
```

Listing 4

```
   10 REM >Frond32 (Info4)
   20 REM By B. Moseley
   30 REM for Archimedes only
   40 REM (c) BAU October 1991
   50 :
   60 MODE 15:OFF
   70 PROCcode
   80 PROCcolours
   90 PROCdrawbase
  100 PROCgrow
  110 END
  120 :
  130 DEF PROCcode
  140 DIM code &1000
  150 x=1
  160 y=2
  170 colour=3
  180 zero=4
  190 rand=5
  200 count=6
  210 write=11
  220 screen=12
  230 sp=13
  240 link=14
  250 pc=15
  260 FOR pass%=Ø TO 2 STEP 2
  270 P%=code
  280 [OPT pass%
  290 .go      ADR      rand,Rand
  300          LDR      screen,Screen
  310          ADD      count,x,colour
  320          MOV      zero,#Ø
  330          CMP      y,#10
  340          MOVLT    y,#10
  350 .loop    ADD      write,screen,y,ASL
 #9
  360          ADD      write,write,y,ASL
#7
  370          ADD      write,write,x
  380          LDRB     RØ,[write,#640]
  390          CMP      RØ,#Ø
  400          BNE      plot
  410          LDRB     RØ,[write,#-640]
  420          CMP      RØ,#Ø
  430          BNE      plot
  440          LDRB     RØ,[write,#1]
  450          CMP      RØ,#Ø
  460          BNE      plot
  470          LDRB     RØ,[write,#-1]
  480          CMP      RØ,#Ø
  490          BNE      plot
  500          LDRB     RØ,[rand,count]
  510          SUBS     count,count,#1
  520          ADDMI    count,count,#1024
  530          CMP      RØ,#2
  540          ADDEQ    x,x,#1
  550          SUBLT    x,x,#1
  560          CMP      RØ,#3
  570          ADDEQ    y,y,#1
  580          SUBGT    y,y,#1
  590          CMP      x,#10
  600          MOVLT    pc,link
  610          CMP      y,#10
  620          MOVLT    pc,link
  630          CMP      x,#628
  640          MOVGE    pc,link
  650          CMP      y,#246
  660          MOVGE    pc,link
  670          B        loop
  680 .plot    STRB     colour,[write]
  690          MOV      pc,link
  700 :
  710 .Screen EQUD      148
  720          EQUD     -1
  730 .Rand
  740 ]
  750 NEXT
  760 SYS "OS_ReadVduVariables",Screen,S
creen
  770 FOR i=Ø TO 1023
  780 IF RND(5)=5 THEN
  790 Rand?i=3
  800 ELSE
  810 Rand?i=RND(4)
  820 ENDIF
  830 NEXT
  840 ENDPROC
  850 :
  860 DEF PROCcolours
  870 DIM cols%(100)
  880 colmax%=Ø
  890 REPEAT
  900 READ col%
  910 IF col%>=Ø THEN
  920 colmax%+=1
  930 cols%(colmax%)=col%
  940 ENDIF
  950 UNTIL col%<Ø
  960 ENDPROC
  970 :
  980 DEF PROCdrawbase
  990 LINE 40,40,1199,40
 1000 *POINTER 1
 1010 MOUSE RECTANGLE 40,40,1199-40,45
 1020 REPEAT
 1030 MOUSE x,y,b
 1040 CASE b OF
 1050 WHEN 1:PROCdot(Ø,Ø)
 1060 WHEN 4:PROCdot(63,162)
 1070 ENDCASE
 1080 UNTIL b=2
 1090 *POINTER Ø
 1100 ENDPROC
 1110 :
 1120 DEF PROCdot(c,t)
 1130 GCOL c TINT t
 1140 POINT x,y
 1150 POINT x+2,y
 1160 ENDPROC
 1170 :
 1180 DEF PROCgrow
 1190 mc=Ø
 1200 top%=220
 1210 col%=Ø
 1220 REPEAT
 1230 B%=RND(620)+10
 1240 C%=top%
 1250 D%=cols%(col%)
 1260 IF RND(1000)<7 top%-=1
 1270 IF RND(1000)<3 col%+=1
 1280 CALL go
 1290 UNTIL col%>colmax%
 1300 ENDPROC
 1310 :
 1320 DATA Ø,8,4,12,16,24,20,28,29,30,31
,60,61,62,63,92,93,94,95
 1330 DATA 124,125,126,127,119,123,115,1
11,103,107,99,227,226,225
 1340 DATA 224,195,194,193,192,163,162,1
61,160,131,130,129,128
 1350 DATA 136,132,140,144,152,148,156,1
57,158,159,188,189,190,191
 1360 DATA 220,221,222,223,252,253,254,2
55
 1370 DATA -1
```

Listing 5

```
   10 REM >Gobble32 (Info5)
   20 REM by A.H.Lancashire
   30 REM for Archimedes only
   40 REM (c) BAU October 1991
   50 :
   60 g%=6
   70 Out%=Ø
   80 Born%=24
   90 DIM gene%(450,g%+4),move%(1,g%),st
at%(g%)
  100 ON ERROR GOTO 1070
  110 MODE 9
  120 PROCsprinkle(1550)
  130 PROCsetup(Born%)
  140 pointx=1279
  150 foodvalue%=14
  160 GCOL 7
  170 LINE 250,Ø,2000,Ø
  180 LINE 1279,Ø,1279,200
  190 VDU 5
  200 IF g%=12 THEN
  210 MOVE Ø,220
  220 PRINT "Lt"
  230 MOVE 1180,220
  240 PRINT "200"
  250 MOVE Ø,160
  260 PRINT "Bk"
  270 MOVE Ø,100
  280 PRINT "Rt"
  290 MOVE Ø,40
  300 PRINT "Fd"
  310 ELSE
  320 VDU 4
  330 PRINTTAB(Ø,25)"LF"
  340 PRINTTAB(37,25)"200"
  350 PRINTTAB(Ø,26)"LB"
  360 PRINT"B"
  370 PRINT"RB"
  380 PRINT"RF"
  390 PRINT"F"
  400 ENDIF
  410 OFF
  420 REPEAT
  430 FOR bugnumber%=1 TO gene%(Ø,Ø)
  440 split%=FALSE
  450 out%=FALSE
  460 twice%=FALSE
  470 T%=RND(100)
  480 C%=Ø
  490 D%=Ø
  500 REPEAT
  510 D%=D%+1
  520 C%=C%+gene%(bugnumber%,D%)
  530 UNTIL C%>=T%
  540 gene%(bugnumber%,g%+1)=((gene%(bug
number%,g%+1)+D%-2)MODg%)+1
  550 newx%=gene%(bugnumber%,g%+2)+move%
(Ø,gene%(bugnumber%,g%+1))
  560 newy%=gene%(bugnumber%,g%+3)+move%
(1,gene%(bugnumber%,g%+1))
  570 PROCfeed(newx%,newy%)
  580 IF newx%<Ø newx%=newx%+1280:twice%
=TRUE:GOTO600
  590 IF newx%>1268 newx%=newx%-1280:twi
ce%=TRUE
  600 IF newy%<256 newy%=newy%+768:twice
%=TRUE:GOTO620
  610 IF newy%>1008 newy%=newy%-768:twic
e%=TRUE
  620 IF twice% PROCfeed(newx%,newy%)
  630 gene%(bugnumber%,Ø)=gene%(bugnumbe
r%,Ø)-gene%(bugnumber%,g%+4)
  640 IF gene%(bugnumber%,Ø)>=80 PROCspl
it(bugnumber%):Born%=Born%+1
  650 IF gene%(bugnumber%,Ø)<=Ø gene%(bu
gnumber%,Ø)=Ø:out%=TRUE:Out%=Out%+1
  660 IF out% PROCdrawbug(gene%(bugnumbe
r%,g%+2),gene%(bugnumber%,g%+3),6)
  670 IF NOT out% AND NOT split% PROCdra
wbug(newx%,newy%,3)
  680 IF split% PROCdrawbug(newx%,newy%,
1)
  690 IF out% PROCpause(5)
  700 PROCdrawbug(gene%(bugnumber%,g%+2)
,gene%(bugnumber%,g%+3),Ø)
  710 gene%(bugnumber%,g%+2)=newx%:gene%
(bugnumber%,g%+3)=newy%
  720 NEXT
  730 PROCsprinkle(15)
  740 M%=1
  750 N%=1
  760 T%=Ø
  770 REPEAT
  780 REPEAT
  790 IF gene%(M%,Ø)=Ø M%=M%+1:T%=T%+1
  800 UNTIL gene%(M%,Ø)<>Ø OR M%>=gene%(
Ø,Ø)
  810 FOR col%=Ø TO g%+4
  820 gene%(N%,col%)=gene%(M%,col%)
  830 NEXT
  840 N%=N%+1
  850 M%=M%+1
  860 UNTIL M%>gene%(Ø,Ø)
  870 gene%(Ø,Ø)=gene%(Ø,Ø)-T%
  880 bug%=gene%(Ø,Ø)
  890 GCOL 3
  900 PLOT &45,pointx,bug%
  910 pointx=pointx-Ø.2
  920 stat%()=Ø
  930 FOR col%=1 TO g%
  940 FOR row%=1 TO bug%
  950 stat%(col%)=stat%(col%)+gene%(row%
,col%)
  960 NEXT
  970 stat%(col%)=stat%(col%)/bug%
  980 NEXT
  990 FOR y%=1 TO g%
 1000 IF g%=12 s%=20*y% ELSE s%=36*y%
 1010 GCOL Ø
 1020 LINE 80,s%,700,s%
 1030 IF y% MOD 3=1 GCOL 1 ELSE GCOL 3
 1040 LINE 80,s%,80+8*(stat%(y%)),s%
 1050 NEXT
 1060 UNTIL FALSE
 1070 IF ERR=18 RUN ELSE MODEØ:REPORT:PR
INT" at line ";ERL:PROCprint
 1080 END
 1090 :
 1100 DEF PROCsetup(b%)
 1110 gene%(Ø,Ø)=b%
 1120 IF g%=12 RESTORE 2020 ELSE RESTORE
 2050
 1130 FOR r%=Ø TO 1
 1140 FOR c%=1 TO g%
 1150 READ move%(r%,c%)
 1160 NEXT
 1170 NEXT
 1180 FOR col%=1 TO g%
 1190 READ gene%(1,col%)
 1200 NEXT
 1210 FOR row%=2 TO b%
 1220 FOR col%=1 TO g%
 1230 gene%(row%,col%)=gene%(1,col%)
 1240 NEXT
 1250 NEXT
 1260 FOR n%=1 TO b%
 1270 gene%(n%,g%+2)=((RND(160)-1)*8)
 1280 gene%(n%,g%+3)=256+((RND(96)-1)*8)
 1290 gene%(n%,Ø)=40
 1300 gene%(n%,g%+1)=RND(g%)
 1310 gene%(n%,g%+4)=RND(3)+3
 1320 PROCdrawbug(gene%(n%,g%+2),gene%(n
%,g%+3),3)
 1330 NEXT
 1340 ENDPROC
 1350 :
 1360 DEF PROCsprinkle(k%)
 1370 n%=Ø
 1380 GCOL 2
 1390 REPEAT
 1400 x%=RND(320)*4
 1410 y%=256+RND(192)*4
 1420 IF POINT(x%,y%)=Ø PLOT 69,x%,y%:n%
=n%+1
 1430 UNTIL n%>=k%
 1440 ENDPROC
 1450 :
 1460 DEF PROCprint
 1470 VDU 14
 1480 FOR n%=1 TO g%+4
 1490 gene%(Ø,n%)=n%
 1500 NEXT
 1510 FOR j%=Ø TO gene%(Ø,Ø)
 1520 FOR k%=Ø TO g%+4
 1530 PRINTTAB(4*k%);gene%(j%,k%);
 1540 NEXT
 1550 PRINT
 1560 NEXT
 1570 PRINT"Out%=";Out%;"  Born%=";Born%
 1580 ENDPROC
 1590 :
 1600 DEF PROCdrawbug(x%,y%,col%)
 1610 GCOL col%
 1620 RECTANGLE FILL x%,y%,12
 1630 ENDPROC
 1640 :
 1650 DEF PROCsplit(n%)
 1660 split%=TRUE
 1670 gene%(n%,Ø)=INT(gene%(n%,Ø)/2)-5
 1680 k%=gene%(Ø,Ø)+1
 1690 gene%(Ø,Ø)=k%
 1700 gene%(k%,g%+2)=newx%
 1710 gene%(k%,g%+3)=newy%
 1720 FOR col%=Ø TO g%
 1730 gene%(k%,col%)=gene%(n%,col%)
 1740 NEXT
 1750 gene%(k%,g%+1)=RND(g%)
 1760 a%=RND(g%)
 1770 b%=RND(g%)
 1780 c%=RND(10)
 1790 gene%(k%,g%+4)=gene%(n%,g%+4)
```

```
1800 IF c%=1 gene%(k%,g%+4)=gene%(k%,g%+4)-1
1810 IF c%=5 OR c%=6 OR c%=7 gene%(k%,g%+4)=gene%(k%,g%+4)+1
1820 IF gene%(k%,g%+4)<3 gene%(k%,g%+4)=3
1830 gene%(k%,a%)=gene%(k%,a%)-6
1840 gene%(k%,b%)=gene%(k%,b%)+6
1850 IF gene%(k%,a%)<0 gene%(k%,b%)=gene%(k%,b%)+gene%(k%,a%):gene%(k%,a%)=0
1860 ENDPROC
1870 :
1880 DEF PROCfeed(a%,b%)
1890 FOR dx%=a% TO a%+12 STEP 4
1900 FOR dy%=b% TO b%+12 STEP 4
1910 IF POINT(dx%,dy%)=2 gene%(bugnumber%,0)=gene%(bugnumber%,0)+foodvalue%
1920 NEXT
1930 NEXT
1940 ENDPROC
1950 :
1960 DEF PROCpause(t%)
1970 T%=TIME
1980 REPEAT
1990 UNTIL TIME>T%+t%
2000 ENDPROC
2010 :
2020 DATA 0,8,16,16,16,8,0,-8,-16,-16,-16,-8
2030 DATA 16,16,8,0,-8,-16,-16,-16,-8,0,8,16
2040 DATA 8,8,9,8,8,9,8,8,9,8,8,9
2050 DATA 0,16,16,0,-16,-16
2060 DATA 16,8,-8,-16,-8,8
2070 DATA 17,17,16,17,17,16
```

Listing 6

```
10 REM >MakeGobSpr (Info6)
20 REM by Dave Acton
30 REM for B/B+/M/C/E
40 REM (c) BAU October 1991
50 :
60 MODE 1
70 VDU 23,224,0,0,0,0,6,15,15,6
80 VDU 5
90 out1%=OPENOUT"GobSpr"
100 out2%=OPENOUT"GobMask"
110 FOR shift%=0 TO 3
120 CLS
130 MOVE 4*shift%-16,1024
140 VDU 224
150 FOR i%=0 TO 15
160 BPUT#out1%,i%?&3000
170 BPUT#out2%,(i%?&3000) EOR 255
180 NEXT
190 NEXT
200 VDU 4
210 CLOSE#out1%
220 CLOSE#out2%
230 END
```

Listing 7

```
10 REM >GobSrc8 (Info7)
20 REM Assembles code for Gobble8
30 REM by Dave Acton
40 REM for B/B+/M/C/E
50 REM (c) BAU October 1991
60 :
70 MODE 6
80 final%=&1A00
90 dir%=&1F00
100 x%=&2000
110 y%=&2100
120 strength%=&2200
130 fitness%=&2300
140 gene%=&2400
150 DIM code% &C00
160 born%=24
170 read=&70
180 write=&72
190 mask=&74
200 count1=&76
210 count2=&77
220 write2=&78
230 column=&7A
240 bugcount=&7B
250 andy=&7C
260 dir=&7D
270 temp=&80
280 gaddr=&82
290 gaddr2=&84
300 temp2=&86
310 scrolladdr%=&3000+512+16*640
320 FOR pass%=4 TO 6 STEP 2
330 P%=final%:O%=code%
340 [OPT pass%
350 JMP sprinkle
360 JMP dobugs
370 JMP initgenes
380 JMP stats
390 JMP pop
400 .rd
410 EQUD TIME
420 :
430 .pop
440 LDX #0
450 LDY #0
460 :
470 .poploop
480 LDA strength%,Y
490 CMP #255
500 BEQ nextpop
510 INX
520 :
530 .nextpop
540 INY
550 BNE poploop
560 TXA
570 RTS
580 :
590 .stats
600 CLC
610 ADC #gene% DIV 256
620 STA gaddr+1
630 LDA #gene% MOD 256
640 STA gaddr
650 LDA #0
660 STA temp
670 STA temp+1
680 LDY #0
690 :
700 .countgenes
710 LDA strength%,Y
720 CMP #255
730 BEQ countnext
740 LDA (gaddr),Y
750 CLC
760 ADC temp
770 STA temp
780 BCC countnext
790 INC temp+1
800 :
810 .countnext
820 INY
830 BNE countgenes
840 LDA temp
850 LDX temp+1
860 RTS
870 :
880 .deletebug
890 LDA #0
900 BEQ mainbug
910 :
920 .showbug
930 LDA #255
940 :
950 .mainbug
960 STA andy
970 JSR showsub
980 :
990 .columnloop
1000 LDX count1
1010 BEQ noloop1
1020 :
1030 .loop1
1040 LDA (write),Y
1050 AND (mask),Y
1060 STA temp
1070 LDA (read),Y
1080 AND andy
1090 ORA temp
1100 STA (write),Y
1110 INY
1120 DEX
1130 BNE loop1
1140 :
1150 .noloop1
1160 LDX count2
1170 BEQ noloop2
1180 :
1190 .loop2
1200 LDA (write2),Y
1210 AND (mask),Y
1220 STA temp
1230 LDA (read),Y
1240 AND andy
1250 ORA temp
1260 STA (write2),Y
1270 INY
1280 DEX
1290 BNE loop2
1300 :
1310 .noloop2
1320 DEC column
1330 BNE columnloop
1340 RTS
1350 :
1360 .showsub
1370 TXA
1380 AND #3
1390 ASL A
1400 ASL A
1410 ASL A
1420 ASL A
1430 ADC #gobspr% MOD 256
1440 STA read
1450 LDA #gobspr% DIV 256
1460 ADC #0
1470 STA read+1
1480 LDA read
1490 CLC
1500 ADC #(gobmask%-gobspr%) MOD 256
1510 STA mask
1520 LDA read+1
1530 ADC #(gobmask%-gobspr%) DIV 256
1540 STA mask+1
1550 TXA
1560 AND #252
1570 STA write
1580 LDA #0
1590 ASL write
1600 ROL A
1610 STA write+1
1620 TYA
1630 LSR A
1640 LSR A
1650 LSR A
1660 TAX
1670 TYA
1680 AND #7
1690 STA count2
1700 CLC
1710 ADC low,X
1720 ADC write
1730 STA write
1740 LDA high,X
1750 ADC write+1
1760 STA write+1
1770 LDA #8
1780 SEC
1790 SBC count2
1800 STA count1
1810 LDA write
1820 CLC
1830 ADC #632 MOD 256
1840 STA write2
1850 LDA write+1
1860 ADC #632 DIV 256
1870 STA write2+1
1880 LDA #2
1890 STA column
1900 LDY #0
1910 RTS
1920 :
1930 .initgenes
1940 LDA #gene% MOD 256
1950 STA write
1960 LDA #gene% DIV 256
1970 STA write+1
1980 LDX #0
1990 LDY #0
2000 :
2010 .igloop1
2020 LDA genedat,X
2030 :
2040 .igloop2
2050 STA (write),Y
2060 INY
2070 BNE igloop2
2080 INC write+1
2090 INX
2100 CPX #12
2110 BNE igloop1
2120 LDA #255
2130 :
2140 .igloop3
2150 STA strength%,Y
2160 INY
2170 BNE igloop3
2180 LDX #born%-1
2190 :
2200 .birthloop
2210 JSR rand
2220 CMP #253
2230 BCS birthloop
2240 STA x%,X
2250 JSR rand
2260 CMP #253
2270 BCS birthloop
2280 STA y%,X
2290 LDA #40
2300 STA strength%,X
2310 :
2320 .gethealth
2330 JSR rand
2340 AND #3
2350 BEQ gethealth
2360 CLC
2370 ADC #3
2380 STA fitness%,X
2390 JSR rand12
2400 STA dir%,X
2410 DEX
2420 BPL birthloop
2430 RTS
2440 :
2450 .genedat
2460 EQUB 11:EQUB 11:EQUB 11:EQUB 10
2470 EQUB 11:EQUB 11:EQUB 11:EQUB 10
2480 EQUB 11:EQUB 11:EQUB 11:EQUB 10
2490 :
2500 .rand12
2510 JSR rand
2520 AND #15
2530 CMP #12
2540 BCS rand12
2550 RTS
2560 :
2570 .rand
2580 TXA
2590 PHA
2600 TYA
2610 PHA
2620 LDY #8
2630 .r1
2640 CLC
2650 LDA rd+3
2660 BPL r3
2670 LDX #3
2680 .r2
2690 LDA rd,X
2700 EOR rc,X
2710 STA rd,X
2720 DEX
2730 BPL r2
2740 SEC
2750 .r3
2760 ROL rd
2770 ROL rd+1
2780 ROL rd+2
2790 ROL rd+3
2800 DEY
2810 BPL r1
2820 PLA
2830 TAY
2840 PLA
2850 TAX
2860 LDA rd+3
2870 RTS
2880 :
2890 .sprinkle
2900 STA count1
2910 .sprinkeloop
2920 JSR rand
2930 TAX
2940 JSR rand
2950 TAY
2960 JSR calcaddr
2970 LDA (write),Y
2980 AND maskbits,X
2990 BNE sprinkeloop
3000 LDA (write),Y
3010 AND notmaskbits,X
3020 ORA foodbits,X
3030 STA (write),Y
3040 DEC count1
3050 BNE sprinkeloop
3060 RTS
3070 :
3080 .calcaddr
3090 TXA
3100 PHA
3110 AND #252
3120 STA write
3130 LDA #0
3140 ASL write
3150 ROL A
3160 STA write+1
3170 TYA
3180 LSR A
3190 LSR A
3200 LSR A
3210 TAX
3220 TYA
3230 AND #7
3240 CLC
3250 ADC low,X
3260 ADC write
3270 STA write
3280 LDA high,X
3290 ADC write+1
3300 STA write+1
3310 PLA
3320 AND #3
3330 TAX
3340 LDY #0
3350 RTS
3360 :
3370 .dobugs
3380 LDA #0
3390 STA bugcount
3400 :
3410 .dobugloop
3420 LDX bugcount
3430 LDA strength%,X
3440 CMP #255
3450 BEQ donextbug
3460 LDY y%,X
3470 LDA x%,X
3480 TAX
3490 JSR deletebug
3500 JSR movebug
3510 JSR feedbug
3520 LDX bugcount
3530 LDA strength%,X
3540 SEC
3550 SBC fitness%,X
3560 BCS notdead
3570 LDA #255
3580 STA strength%,X
3590 JMP donextbug
3600 :
3610 .notdead
3620 STA strength%,X
3630 CMP #80
3640 BCC dontsplit
3650 JSR reproduce
3660 :
3670 .dontsplit
3680 LDY y%,X
3690 LDA x%,X
3700 TAX
3710 JSR showbug
3720 :
3730 .donextbug
3740 INC bugcount
3750 BNE dobugloop
3760 RTS
3770 :
3780 .reproduce
3790 STX temp
3800 LDX #0
3810 :
3820 .findfreeone
3830 LDA strength%,X
3840 CMP #255
3850 BEQ foundfreeone
3860 INX
3870 BNE findfreeone
3880 RTS
3890 :
3900 .foundfreeone
3910 STX temp2
3920 LDY temp
```

```
3930 LDA strength%,Y
3940 LSR A
3950 SEC
3960 SBC #5
3970 STA strength%,Y
3980 STA strength%,X
3990 LDA x%,Y
4000 STA x%,X
4010 LDA y%,Y
4020 STA y%,X
4030 LDA fitness%,Y
4040 STA fitness%,X
4050 LDA #gene% MOD 256
4060 STA gaddr
4070 LDA #gene% DIV 256
4080 STA gaddr+1
4090 LDX #12
4100 :
4110 .copygenes
4120 LDY temp
4130 LDA (gaddr),Y
4140 LDY temp2
4150 STA (gaddr),Y
4160 INC gaddr+1
4170 DEX
4180 BNE copygenes
4190 LDX temp2
4200 JSR rand12
4210 STA dir%,X
4220 JSR rand
4230 CMP #25
4240 BCS notfitter
4250 DEC fitness%,X
4260 :
4270 .notfitter
4280 CMP #178
4290 BCC notweaker
4300 INC fitness%,X
4310 :
4320 .notweaker
4330 LDA fitness%,X
4340 CMP #3
4350 BCS nottoostrong
4360 LDA #3
4370 STA fitness%,X
4380 :
4390 .nottoostrong
4400 LDA #gene% MOD 256
4410 STA gaddr
4420 STA gaddr2
4430 JSR rand12
4440 CLC
4450 ADC #gene% DIV 256
4460 STA gaddr+1
4470 JSR rand12
4480 CLC
4490 ADC #gene% DIV 256
4500 STA gaddr2+1
4510 LDY temp2
4520 LDA (gaddr),Y
4530 CLC
4540 ADC #6
4550 STA (gaddr),Y
4560 LDA (gaddr2),Y
4570 SEC
4580 SBC #6
4590 BCS notdeadgene
4600 ADC (gaddr),Y
4610 STA (gaddr),Y
4620 LDA #Ø
4630 STA (gaddr2),Y
4640 RTS
4650 .notdeadgene
4660 STA (gaddr2),Y
4670 RTS
4680 :
4690 .movebug
4700 LDA #gene% MOD 256
4710 STA gaddr
4720 LDA #gene% DIV 256
4730 STA gaddr+1
4740 LDX #Ø
4750 STX temp
4760 DEX
4770 JSR rand
4780 AND #127
4790 STA temp2
4800 :
4810 .getranddir
4820 LDY bugcount
4830 LDA (gaddr),Y
4840 INC gaddr+1
4850 INX
4860 CLC
4870 ADC temp
4880 STA temp
4890 CMP temp2
4900 BCC getranddir
4910 TXA
4920 LDX bugcount
4930 CLC
4940 ADC dir%,X
4950 CMP #12
4960 BCC lessthan12
4970 SBC #12
4980 :
4990 .lessthan12
5000 STA dir%,X
5010 TAY
5020 LDA x%,X
5030 .xisoff
5040 CLC
5050 ADC xtab,Y
5060 CMP #253
5070 BCS xisoff
5080 STA x%,X
5090 LDA y%,X
5100 :
5110 .yisoff
5120 CLC
5130 ADC ytab,Y
5140 CMP #253
5150 BCS yisoff
5160 STA y%,X
5170 RTS
5180 :
5190 .feedbug
5200 LDA #3
5210 STA count1
5220 :
5230 .feedloop1
5240 LDA #3
5250 STA count2
5260 :
5270 .feedloop2
5280 LDX bugcount
5290 LDA y%,X
5300 CLC
5310 ADC count1
5320 TAY
5330 LDA x%,X
5340 CLC
5350 ADC count2
5360 TAX
5370 JSR calcaddr
5380 LDA (write),Y
5390 AND maskbits,X
5400 CMP foodbits,X
5410 BNE nofoodhere
5420 LDA (write),Y
5430 AND notmaskbits,X
5440 STA (write),Y
5450 LDX bugcount
5460 LDA strength%,X
5470 CLC
5480 ADC #14
5490 STA strength%,X
5500 :
5510 .nofoodhere
5520 DEC count2
5530 BPL feedloop2
5540 DEC count1
5550 BPL feedloop1
5560 RTS
5570 :
5580 .maskbits
5590 EQUD &11224488
5600 .notmaskbits
5610 EQUD &EEDDBB77
5620 .foodbits
5630 EQUD &Ø1Ø2Ø4Ø8
5640 :
5650 .rc
5660 EQUD &768553
5670 ]
5680 low=FNalloc(32)
5690 high=FNalloc(32)
5700 xtab=FNalloc(12)
5710 ytab=FNalloc(12)
5720 gobspr%=FNalloc(&4Ø)
5730 gobmask%=FNalloc(&4Ø)
5740 NEXT pass%
5750 FOR i%=Ø TO 31
5760 a%=&3ØØØ+64Ø*i%
5770 i%?FNa(low)=a% MOD 256
5780 i%?FNa(high)=a% DIV 256
5790 NEXT
5800 FOR i%=Ø TO 11
5810 READ a%,b%
5820 i%?FNa(xtab)=a%*2
5830 i%?FNa(ytab)=b%*2
5840 NEXT
5850 OSCLI"LOAD GobSpr "+STR$~FNa(gobsp
r%)
5860 OSCLI"LOAD GobMask "+STR$~FNa(gobm
ask%)
5870 OSCLI"SAVE GobCode "+STR$~code%+"
"+STR$~O%
5880 END
5890 :
5900 DEF FNalloc(bytes%)
5910 P%=P%+bytes%
5920 O%=O%+bytes%
5930 =P%-bytes%
5940 :
5950 DEF FNa(a%)
5960 =a%-final%+code%
5970 :
5980 DATA Ø,2,1,2,2,1,2,Ø,2,-1,1,-2,Ø,-
2,-1,-2,-2,-1,-2,Ø,-2,1,-1,2
```

Listing 8

```
10 REM >Gobble8 (Info8)
20 REM 8-bit evolution
30 REM by Dave Acton
40 REM for B/B+/M/C/E
50 REM (c) BAU October 1991
60 :
70 IF PAGE>&12ØØ THEN PAGE=&12ØØ:CHAI
N"Gobble8"
80 MODE 1
90 VDU 23;82Ø2;Ø;Ø;Ø;
100 VDU 19,1,2,Ø;Ø;Ø;
110 VDU 19,2,6,Ø;Ø;Ø;
120 HIMEM=&1AØØ
130 DIM g%(11)
140 *LOAD GobCode 1AØØ
150 sprinkle=&1AØØ
160 dobugs=&1AØ3
170 initgenes=&1AØ6
180 stats=&1AØ9
190 pop=&1AØC
200 !&1AØF=TIME
210 REPEAT
220 CLS
230 x%=34*32
240 FOR i%=Ø TO 11
250 y%=1Ø28-32*(i%+8)
260 GCOL Ø,3
270 MOVE x%,y%
280 PLOT 1,24,Ø
290 PLOT 1,Ø,24
300 PLOT 1,-24,Ø
310 PLOT 1,Ø,-24
320 a=i%*PI/6
330 MOVE x%+12,y%+12
340 PLOT 1,12*SIN(a),12*COS(a)
350 NEXT
360 COLOUR 3
370 PRINTTAB(33,Ø)"Gen:"
380 PRINTTAB(33,3)"Pop:"
390 PRINTTAB(33,6)"Genes:"
400 COLOUR 2
410 CALL initgenes
420 PROCsprinkle(155Ø)
430 yplot%=4ØØ
440 plotcol%=2
450 gen%=Ø
460 REPEAT
470 FOR it%=1 TO 1Ø
480 PROCsprinkle(25)
490 CALL dobugs
500 NEXT
510 gen%=gen%+1Ø
520 t%=Ø
530 FOR A%=Ø TO 11
540 g%(A%)=USR(stats) AND &FFFF
550 t%=t%+g%(A%)
560 NEXT
570 IF t%>Ø PROCstats
580 UNTIL t%=Ø
590 UNTIL FALSE
600 END
610 :
620 DEF PROCstats
630 n%=USR(pop) AND &FF
640 PRINTTAB(34,1);gen%
650 PRINTTAB(34,4);n%;"  "
660 FOR i%=Ø TO 11
670 PRINTTAB(35,i%+7)RIGHT$("  "+STR$I
NT(g%(i%)/t%*1ØØ),3)"%"
680 NEXT
690 GCOL Ø,Ø
700 MOVE 1Ø24,yplot%
710 DRAW 128Ø,yplot%
720 GCOL Ø,plotcol%
730 PLOT 69,1Ø4Ø+224*(n%/256),yplot%
740 yplot%=yplot%-4
750 IF yplot%<Ø yplot%=4ØØ:plotcol%=5-
plotcol%
760 ENDPROC
770 :
780 DEF PROCsprinkle(n%)
790 REPEAT
800 A%=n%
810 IF A%>256 A%=256
820 CALL sprinkle
830 n%=n%-A%
840 UNTIL n%=Ø
850 ENDPROC
```

Listing 9

```
10 REM >Fragger (Info9)
20 REM Displays ADFS fragments
30 REM by Richard Browning
40 REM for B/B+/M/C/E with ADFS
50 REM (c) BAU October 1991
60 :
70 MODE 7
80 PRINTCHR$136"Ensure ADFS is select
ed"
90 REPEAT
100 PRINT''CHR$13Ø"Which drive do you
wish to mount (Ø/1)?";
110 D%=GET-48
120 UNTIL D%=Ø OR D%=1
130 OSCLI("MOUNT "+STR$D%)
140 VDU 23;82Ø2;Ø;Ø;Ø;12
150 PROCsetup
160 PROCsf
170 key=GET
180 IF (nums%+1)>2Ø CLS:PRINT"Do you w
ant to *COMPACT the disc (Y/N)?";:K%=GET
:IF K%=ASC"Y" OR K%=ASC"y" VDU ASC"Y":OS
CLI"COMPACT":CLS:RUN ELSE VDU ASC"N"
190 CLS
200 END
210 :
220 DEF PROCoutsidebox(hdr$)
230 PRINTTAB(Ø,Ø)CHR$146STRING$(38,CHR
$172)
240 PRINTTAB(Ø,24)CHR$146STRING$(38,CH
R$172);
250 FOR C%=1 TO 23
260 VDU 31,Ø,C%,146,181,31,37,C%,146,2
34
270 NEXT
280 VDU 31,1,Ø,188,31,38,Ø,236,31,1,24
,173,31,38,24,174
290 VDU 31,3,1,132,157,13Ø,31,36,1,156
300 PRINTTAB((4Ø-LENhdr$)/2,1)hdr$;
310 ENDPROC
320 :
330 DEF PROCsf
340 PROCoutsidebox("Fragmentation")
350 PRINTTAB(1,3)STRING$(38,CHR$172)TA
B(1,19)STRING$(38,CHR$172)
360 FOR I%=4 TO 18
370 PRINTTAB(Ø,I%)CHR$132CHR$157CHR$15
ØCHR$181STRING$(32,CHR$255)CHR$234"  "CH
R$156
380 NEXT
390 PRINTTAB(3,2Ø)CHR$13Ø"Key: "CHR$15
ØCHR$178CHR$13Ø" location of free space"
400 PROCreadfrags
410 nums%=(secdata%?51Ø DIV 3)-1
420 A%=113
430 CALL osword
440 PRINTTAB(1Ø,22)CHR$131"Disc has:"C
HR$129;INT(!pblk%/1Ø24);"K"CHR$131"free"
;
450 PRINTTAB(12,23)CHR$131"and is:"CHR
$129;1.25*nums%;"%"CHR$131"fragmented";
460 fsp%=secdata%
470 x%=8:y%=12
480 FOR l%=Ø TO nums%
490 !sector=!fsp% AND &FFFFFF
500 !length=fsp%!&1ØØ AND &FFFFFF
510 fsp%=fsp%+3
520 CALL drawfrag
530 NEXT
540 ENDPROC
550 :
560 DEF PROCwritepix(X%,Y%,A%)
570 CALL writepix
580 ENDPROC
590 :
600 DEF PROCreadfrags
610 osword=&FFF1
620 read=&72
630 X%=pblk% MOD 256
640 Y%=pblk% DIV 256
650 ?pblk%=Ø
660 pblk%!1=secdata%
670 pblk%?5=&8
680 pblk%?6=Ø
690 pblk%?7=Ø
700 pblk%?8=Ø
710 pblk%?9=2
720 A%=read
730 CALL osword
740 ENDPROC
750 :
760 DEF PROCsetup
770 DIM pblk% 15,secdata% 512
780 PROCassem
790 ENDPROC
800 :
810 DEF PROCassem
820 addr1=&7Ø
830 addr2=&71
840 lobyte=&72
850 hibyte=&73
860 DIM code% 5ØØ
870 FOR pass%=Ø TO 2 STEP 2
880 P%=code%
890 [OPT pass%
900 .calcaddr
910 TXA
920 PHA
930 AND #1
940 STA xoff
950 PLA
960 LSR A
970 STA xchar
980 LDA yotab,Y
990 STA yoff
1000 LDA yctab,Y
1010 STA ychar
1020 LDX #Ø
1030 STX hibyte
1040 ASL A
1050 ROL hibyte
1060 ASL A
1070 ROL hibyte
1080 ASL A
1090 ROL hibyte
1100 STA addr1
1110 LDX hibyte
1120 STX addr2
1130 ASL A
1140 ROL hibyte
1150 ASL A
1160 ROL hibyte
1170 CLC
1180 ADC addr1
1190 STA addr1
1200 LDA addr2
1210 ADC #&7C
1220 STA addr2
1230 CLC
1240 LDA xchar
1250 ADC addr1
1260 STA addr1
1270 LDA addr2
1280 ADC hibyte
1290 STA addr2
1300 RTS
1310 :
1320 .writepix
1330 STA pix
1340 JSR calcaddr
1350 LDY #Ø
1360 LDA (addr1),Y
```

```
1370 BNE noset
1380 LDA #160
1390 .noset
1400 PHA
1410 LDA yoff
1420 ASL A
1430 CLC
1440 ADC xoff
1450 TAY
1460 LDA pixvals,Y
1470 STA pixtemp
1480 PLA
1490 LDX pix
1500 BEQ unsetpix
1510 ORA pixtemp
1520 LDY #Ø
1530 STA (addr1),Y
1540 RTS
1550 :
1560 .unsetpix
1570 STA pix
1580 LDA #255
1590 SEC
1600 SBC pixtemp
1610 AND pix
1620 LDY #Ø
1630 STA (addr1),Y
1640 RTS
1650 :
1660 .drawfrag
1670 LDA #Ø
1680 STA sectemp
1690 .dfloop
1700 LDA sector
1710 STA sectemp
1720 AND #63
1730 CLC
1740 ADC #8
1750 TAX
1760 LDA sector+1
1770 LSR A
1780 ROR sectemp
1790 LSR A
1800 ROR sectemp
1810 LSR A
1820 ROR sectemp
1830 LSR A
1840 ROR sectemp
1850 LSR A
1860 ROR sectemp
1870 LSR A
1880 ROR sectemp
1890 LDA sectemp
1900 CLC
1910 ADC #12
1920 TAY
1930 LDA #Ø
1940 JSR writepix
1950 INC sector
1960 BNE nisec
1970 INC sector+1
1980 .nisec
1990 LDA length
2000 BEQ exit1
2010 DEC length
2020 JMP dfloop
2030 .exit1
2040 DEC length
2050 DEC length+1
2060 BMI exit2
2070 JMP dfloop
2080 .exit2
2090 RTS
2100 .sector
2110 EQUD Ø
2120 .sectemp
2130 EQUB Ø
2140 .length
2150 EQUD Ø
2160 .pix
2170 EQUB Ø
2180 .pixtemp
2190 EQUB Ø
2200 .pixvals
2210 EQUB 1
2220 EQUB 2
2230 EQUB 4
2240 EQUB 8
2250 EQUB 16
2260 EQUB 64
2270 .xoff
2280 EQUB Ø
2290 .xchar
2300 EQUB Ø
2310 .yoff
2320 EQUB Ø
2330 .ychar
2340 EQUB Ø
2350 .yotab
2360 ]
2370 yp%=Ø
2380 FOR P%=P% TO P%+74
2390 ?P%=yp% MOD 3
2400 yp%=yp%+1
2410 NEXT
2420 P%=P%+75
2430 [OPT pass%
2440 .yctab
2450 ]
2460 yc%=Ø
2470 FOR P%=P% TO P%+74
2480 ?P%=yc% DIV 3
2490 yc%=yc%+1
2500 NEXT
2510 NEXT
2520 ENDPROC
```

Listing 10

```
10 REM >WAIsource (Info1Ø)
20 REM By A.G.L. Spruit
30 REM For Electron only
40 REM (c) October 1991
50 :
60 DIM code &2ØØ
70 oswrch=&FFEE
80 osword=&FFF1
90 osbyte=&FFF4
100 osargs=&FFDA
110 osnewl=&FFE7
120 zpblk =&7Ø
130 pptr  =&74
140 length=&75
150 sector=&CØØ
160 FOR pass=Ø TO 2 STEP 2
170 P%=&9ØØ:O%=code
180 [OPT pass+4
190 LDA #&81
200 LDX #&ØØ
210 LDY #&FF
220 JSR osbyte
230 CPX #&Ø1
240 BEQ electron
250 BRK
260 EQUB Ø
270 EQUS "Electron only"+CHR$Ø
280 .electron
290 LDA #&ØØ
300 LDX #zpblk
310 LDY #&ØØ
320 JSR osargs
330 CMP #&Ø8
340 BEQ adfs
350 BRK
360 EQUB Ø
370 EQUS "ADFS only"+CHR$Ø
380 .adfs
390 LDX #12
400 .getcurrentdirloop
410 LDA &16CC,X
420 STA sector+&CC,X
430 DEX
440 BPL getcurrentdirloop
450 LDA #Ø
460 STA pptr
470 .getpathloop
480 JSR addnametopath
490 LDX pptr
500 LDA path,X
510 CMP #ASC"$"
520 BEQ rootreached
530 LDA #ASC"."
540 JSR addtopath
550 JSR getparentaddress
560 JSR fetchparentdata
570 JMP getpathloop
580 .rootreached
590 LDX #Ø
600 .textloop
610 LDA text,X
620 JSR oswrch
630 CMP #13
640 BEQ printpath
650 INX
660 JMP textloop
670 .printpath
680 LDX pptr
690 .printpathloop
700 LDA path,X
710 JSR oswrch
720 DEX
730 BPL printpathloop
740 JMP osnewl
750 :
760 .addnametopath
770 LDX #9
780 .scannameloop
790 LDA sector+&CC,X
800 CMP #13
810 BNE notcr
820 STX length
830 .notcr
840 DEX
850 BNE scannameloop
860 LDX length
870 DEX
880 .addnameloop
890 LDA sector+&CC,X
900 JSR addtopath
910 DEX
920 BPL addnameloop
930 RTS
940 :
950 .getparentaddress
960 CLC
970 LDA sector+&D6
980 ADC #4
990 STA discaddr+2
1000 LDA sector+&D7
1010 ADC #Ø
1020 STA discaddr+1
1030 LDA sector+&D8
1040 STA discaddr
1050 RTS
1060 :
1070 .fetchparentdata
1080 LDA #&72
1090 LDX #parblock MOD 256
1100 LDY #parblock DIV 256
1110 JMP osword
1120 :
1130 .addtopath
1140 TAY
1150 TXA
1160 PHA
1170 LDX pptr
1180 TYA
1190 STA path,X
1200 CMP #ASC"$"
1210 BEQ return
1220 INX
1230 .return
1240 STX pptr
1250 PLA
1260 TAX
1270 RTS
1280 :
1290 .parblock
1300 EQUB Ø
1310 EQUD sector
1320 EQUB &Ø8
1330 .discaddr
1340 EQUB Ø:EQUB Ø:EQUB Ø
1350 EQUW 1
1360 EQUD Ø
1370 :
1380 .text
1390 EQUS "You are in directory:"
1400 EQUB 1Ø:EQUB 13
1410 :
1420 .path
1430 ]NEXT
1440 OSCLI"SAVE WhereAmI "+STR$~code+"
"+STR$~O%+" 9ØØ 9ØØ"
```

Listing 11

```
10 REM >Mond1 (Info11)
20 MODE2:VDU19,2,4;Ø;23;82Ø2;Ø;Ø;Ø;:R
EPEATVDU17,135,12,18;Ø:FORz=ØTORND(3):y=
RND(1Ø23):VDU24,Ø;y-8;1279;y;16:NEXT:FOR
z=ØTORND(3):x=RND(1279):VDU24,x;Ø;x+8;1Ø
23;16,26:NEXT:FORc=1TO3:GCOLØ,c:REPEATx=
RND(1279):y=RND(1Ø23):UNTILPOINT(x,y)=7:
REPEATy=y-4:UNTILPOINT(x,y)<1:y=y+4:REPE
ATx=x-8:UNTILPOINT(x,y)<1:x=x+8:REPEATPL
OT93,x,y:y=y+4:UNTILPOINT(x,y)<1:NEXT:IF
GETUNTILØ
```

Listing 12

```
10 *KEY Ø DIM mem 3ØØ:$mem="*KEYØ":t=
mem+5:f=PAGE:REPEAT:l=f?3-4:f=f+4:FORi=1
TOl:b=?f:?t=b:t=t+1:f=f+1:NEXT:?t=ASC":"
:t=t-(b<>&F5):UNTIL f=TOP-2:$(t-1)="||M"
:X%=mem MOD 256:Y%=mem DIV 256:CALL &FFF
7|M
```

Listing 13

```
10 REM >Scroll1 (Info13)
20 REM Vertical hardware scroll
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU October 1991
60 :
70 testmode%=9
80 DIM q% 5
90 MODE testmode%
100 SYS "OS_ReadDynamicArea",2 TO ,mem
%
110 SYS "OS_ReadModeVariable",testmode
%,6 TO ,,bytesperrow%
120 SYS "OS_ReadModeVariable",testmode
%,2 TO ,,maxrow%
130 SYS "OS_ReadModeVariable",testmode
%,3 TO ,,ncolour%
140 IF ncolour%=15 ncolour%=7
150 total%=mem% DIV bytesperrow%
160 line%=Ø
170 VDU 5
180 REPEAT
190 WAIT
200 PROCsetscreenstart(bytesperrow%*li
ne%)
210 line%=(line%+1) MOD total%
220 a%=line% MOD 8
230 b%=line% DIV 8
240 GCOL Ø
250 RECTANGLE FILL Ø,Ø,1279,4
260 GCOL (b% MOD ncolour%)+1
270 MOVE Ø,4*a%
280 PRINT"This is row ";b%;
290 UNTIL FALSE
300 END
310 :
320 DEF PROCsetscreenstart(off%)
330 ?q%=3
340 q%!1=off%
350 SYS "OS_Word",22,q%
360 ENDPROC
```

Listing 14

```
10 REM >Scroll2 (Info14)
20 REM Horizontal hardware scroll
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU October 1991
60 :
70 DIM q% 5
80 MODE 13
90 OFF
100 SYS "OS_ReadDynamicArea",2 TO ,mem
%
110 off%=Ø
120 top%=RND(256)+128
130 bot%=RND(256)+128
140 REPEAT
150 WAIT
160 PROCsetscreenstart(off%)
170 GCOL Ø TINT Ø
180 RECTANGLE FILL 1264,Ø,16,1Ø24
190 GCOL 12
200 FOR i%=Ø TO 12 STEP 4
210 LINE 1264+i%,Ø,1264+i%,bot%
220 LINE 1264+i%,1Ø23,1264+i%,1Ø23-top
%
230 bot%=bot%+RND(9)-5
240 top%=top%+RND(9)-5
250 IF bot%<128 bot%=128
260 IF bot%>384 bot%=384
270 IF top%<128 top%=128
280 IF top%>384 top%=384
290 NEXT
300 off%=(off%+4) MOD mem%
310 UNTIL FALSE
320 END
330 :
340 DEF PROCsetscreenstart(off%)
350 ?q%=3
360 q%!1=off%
370 SYS "OS_Word",22,q%
380 ENDPROC
```

Listing 15

```
10 REM >Scroll3 (Info15)
20 REM Horizontal scrolling in Basic
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU October 1991
60 :
70 MODE 13
80 OFF
90 SYS "OS_ReadDynamicArea",2 TO ,mem
%
100 off%=Ø
110 top%=RND(256)+128
120 bot%=RND(256)+128
130 GCOL 12
140 REPEAT
150 WAIT
160 RECTANGLE FILL Ø,Ø,128Ø,1Ø24 TO -4
,Ø
170 LINE 1279,Ø,1279,bot%
180 LINE 1279,1Ø23,1279,1Ø23-top%
190 bot%=bot%+RND(9)-5
200 top%=top%+RND(9)-5
210 IF bot%<128 bot%=128
220 IF bot%>384 bot%=384
230 IF top%<128 top%=128
240 IF top%>384 top%=384
250 UNTIL FALSE
260 END
```

Listing 16

```
10 REM >Scroll4 (Info16)
20 REM Horizontal software scroll
30 REM by Dave Acton
40 REM for Archimedes only
50 REM (c) BAU October 1991
60 :
70 MODE 9
80 OFF
90 PROCass
100 top%=128
110 bot%=128
120 GCOL 2
130 REPEAT
140 WAIT
150 CALL scroll
160 LINE 1279,Ø,1279,bot%+128
170 LINE 1279,1Ø23,1279,1Ø23-128-top%
180 bot%=bot%+RND(9)-5
190 top%=top%+RND(9)-5
200 IF bot%<Ø bot%=Ø
210 IF bot%>255 bot%=255
220 IF top%<Ø top%=Ø
230 IF top%>255 top%=255
240 UNTIL FALSE
250 END
260 :
270 DEF PROCass
280 DIM code% &4ØØ
290 sp=13:link=14:pc=15
300 FOR pass%=Ø TO 2 STEP 2
310 P%=code%
320 [OPT pass%
330 .scroll
340 STMFD   (sp)!,{link}
350 LDR     r12,screen
360 MOV     r14,#256
370 .loop1
380 ]
390 FOR s%=1 TO 4
400 [OPT pass%
410 LDMIA   (12),{rØ-r1Ø}
420 ]
430 FOR i%=Ø TO 9
440 j%=i%+1
450 [OPT pass%
460 MOV     r11,j%,ASL #28
470 ORR     i%,r11,i%,LSR #4
480 ]
```

```
  490 NEXT i%
  500 IF s%=4 THEN
  510 [OPT pass%
  520 BIC     r9,r9,#&F0000000
  530 ]
  540 ENDIF
  550 [OPT pass%
  560 STMIA   (12)!,{r0-r9}
  570 ]
  580 NEXT s%
  590 [OPT pass%
  600 SUBS    r14,r14,#1
  610 BNE     loop1
  620 LDMFD   (sp)!,{pc}
  630 :
  640 .screen
  650 EQUD    148
  660 EQUD    -1
  670 ]
  680 NEXT pass%
  690 SYS "OS_ReadVduVariables",screen,screen
  700 ENDPROC
```

Listing 17

```
   10 REM >Pendulum (Info17)
   20 REM for Archimedes only
   30 REM by Michael Attenborough
   40 REM (C) BAU October 1991
   50 :
   60 ON ERROR PROCerror:END
   70 MODE 140:OFF:REM or 148!
   80 PROCinit
   90 PROCbackground
  100 FOR i=1 TO 2
  110 PROCswap
  120 PROCinstruc
  130 NEXT
  140 PROCswing
  150 END
  160 :
  170 DEF PROCinit
  180 IF MODE=20 THEN space=80000 ELSE space=40000
  190 DIM spr space
  200 !spr=space:spr!4=0:spr!8=16:spr!12=16
  210 *FX 4,1
  220 *Alphabet BFont
  230 COLOUR 8,0,0,0
  240 COLOUR 1,240,0,0:COLOUR 9,180,0,0:REM base
  250 COLOUR 2,0,240,0:COLOUR 10,0,180,0:REM pillar
  260 COLOUR 3,240,240,240:REM wire
  270 COLOUR 4,0,0,240:COLOUR 12,0,0,180:REM magnet
  280 bank%=1
  290 pc%=0
  300 instrucs%=7
  310 COLOUR 5,instrucs%:COLOUR 5
  320 lim=250
  330 m=20
  340 g=0.2
  350 penlen%=800
  360 k%=-600000
  370 sel%=0
  380 rot%=15
  390 alt%=500
  400 frn%=4
  410 Y=lim*3/4
  420 X=0
  430 vx=14
  440 vy=0
  450 PROCcalcABZ
  460 PROC3Dinit
  470 MOUSE RECTANGLE -lim,-lim,lim*2,lim*2
  480 DIM fric(7)
  490 fric()=10,3,1,.3,.1,.03,.01,0
  500 ine=1-fric(frn%)*.01
  510 ENDPROC
  520 :
  530 DEF PROC3Dinit
  540 sxs=640:sys=512:ORIGIN 640,512
  550 rs=2000:rinf=rs+500
  560 tanB=sxs/rs:B=ATN(tanB)
  570 DIM Ry(2,2),Rz(2,2),X(2),S(2)
  580 S(0)=penlen%-350
  590 Ry(1,1)=1:Rz(2,0)=1
  600 ENDPROC
  610 :
  620 DEF PROCinstruc
  630 CLS
  640 PRINT'"Use select button and ",TAB(55);"Use up and down cursor  "
  650 PRINT"mouse to move pendulum",TAB(55);"keys to select variable,"
  660 PRINTTAB(55);"left and right to change"
  670 PRINTTAB(55);"the value"
  680 PRINT''"  Friction:",TAB(55);"Press the space bar to  "
  690 PRINT"  Rotation:",TAB(55);"toggle the instructions "
  700 PRINT"  Pendulum length:",TAB(55);"on and off"
  710 PRINT"  Magnet strength:"
  720 PRINT"  Mass of bob:"
  730 PRINT"  Gravity:"
  740 PROCpvals
  750 ENDPROC
  760 :
  770 DEF PROCpvals
  780 PRINTTAB(12,7);fric(frn%);"%   "
  790 PRINTTAB(12,8);rot%;CHR$160;"  "
  800 PRINTTAB(19,9);penlen%;"  "
  810 PRINTTAB(19,10);k% DIV 10000;"  "
  820 PRINTTAB(15,11);m;"  "
  830 @%=&20A:PRINTTAB(11,12);g;"   ":@%=&90A
  840 PRINTTAB(0,7);:VDU32
  850 FOR I%=1 TO 5:VDU 8,10,32:NEXT
  860 PRINTTAB(0,7+sel%);">"
  870 pc%-=1
  880 ENDPROC
  890 :
  900 DEF PROCswing
  910 REPEAT
  920 PROCswap
  930 K%=INKEY(0)
  940 IF K%>-1 THEN PROCkeys
  950 IF pc%>0 THEN PROCpvals
  960 SYS "OS_SpriteOp",34+256,spr,"backg",-290,-512,0
  970 IF INKEY(-10) THEN
  980 PROCmouse
  990 ELSE
 1000 PROCcalc
 1010 PROCcalcABZ
 1020 ENDIF
 1030 PROCdraw
 1040 UNTIL FALSE
 1050 ENDPROC
 1060 :
 1070 DEF PROCkeys
 1080 IF K%=32 instrucs%=instrucs% EOR 7:COLOUR 5,instrucs%
 1090 IF K%=139 AND sel%>0 THEN sel%-=1:pc%=2
 1100 IF K%=138 AND sel%<5 THEN sel%+=1:pc%=2
 1110 flag%=0
 1120 IF K%=137 THEN
 1130 pc%=2
 1140 CASE sel% OF
 1150 WHEN 0:IF frn%>0 THEN frn%-=1
 1160 WHEN 1:IF rot%+2<90 THEN rot%+=5:flag%=1
 1170 WHEN 2:IF penlen%<900 THEN penlen%+=50:flag%=1
 1180 WHEN 3:IF k%<500000 THEN k%+=100000
 1190 WHEN 4:IF m<100 THEN m+=10
 1200 WHEN 5:IF g<1 THEN g+=.05
 1210 ENDCASE
 1220 ENDIF
 1230 IF K%=136 THEN
 1240 pc%=2
 1250 CASE sel% OF
 1260 WHEN 0:IF frn%<7 THEN frn%+=1
 1270 WHEN 1:IF rot%-2>-90 THEN rot%-=5:flag%=1
 1280 WHEN 2:IF penlen%>lim+150 THEN penlen%-=50:flag%=1
 1290 WHEN 3:IF k%>-800000 THEN k%-=100000
 1300 WHEN 4:IF m>10 THEN m-=10
 1310 WHEN 5:IF g>.05 THEN g-=.05
 1320 ENDCASE
 1330 ENDIF
 1340 IF flag%=1 THEN PROCbackground:PROCinstruc:pc%=2
 1350 ine=1-fric(frn%)*.01
 1360 *FX 21,0
 1370 ENDPROC
 1380 :
 1390 DEF PROCdraw
 1400 IF ABS(X)>lim THEN
 1410 X=lim*.99*SGN(X)
 1420 vx=0
 1430 PROCcalcABZ
 1440 SOUND 1,-10,100,1
 1450 ENDIF
 1460 IF ABS(Y)>lim THEN
 1470 Y=lim*.99*SGN(Y)
 1480 vy=0
 1490 PROCcalcABZ
 1500 SOUND 1,-10,100,1
 1510 ENDIF
 1520 GCOL 1,8
 1530 PROCplot(4,0,0,-penlen%-80)
 1540 PROCplot(5,X,Y,-penlen%-80)
 1550 PROCellip(X,Y,-penlen%-80)
 1560 GCOL 3
 1570 PROCplot(4,0,0,0)
 1580 PROCplot(5,X,Y,Z)
 1590 PROCcirc(X,Y,Z)
 1600 ENDPROC
 1610 :
 1620 DEF PROCcalc
 1630 ah=m*g*SIN(A)*COS(A)
 1640 PROCmagnet( lim/3, lim/3)
 1650 PROCmagnet(-lim/3,-lim/3)
 1660 PROCmagnet( lim/3,-lim/3)
 1670 PROCmagnet(-lim/3, lim/3)
 1680 vx-=ah*COS(B)
 1690 vy-=ah*SIN(B)
 1700 X+=vx*ine
 1710 Y+=vy*ine
 1720 ENDPROC
 1730 :
 1740 DEF PROCcalcABZ
 1750 R=SQR(X*X+Y*Y)
 1760 A=ASN(R/penlen%)
 1770 B=FNpol(X,Y)
 1780 Z=-penlen%*COS(A)
 1790 ENDPROC
 1800 :
 1810 DEF PROCmagnet(mx,my)
 1820 dx=X-mx
 1830 dy=Y-my
 1840 dz=Z+penlen%+30
 1850 d2=dx*dx+dy*dy+dz*dz
 1860 acc=k%/(d2*m)
 1870 d=SQR(d2)
 1880 vx+=acc*dx/d
 1890 vy+=acc*dy/d
 1900 ENDPROC
 1910 :
 1920 DEF PROCmouse
 1930 MOUSE TO X,Y
 1940 REPEAT
 1950 vx=X
 1960 vy=Y
 1970 MOUSE mx%,my%,b%
 1980 R=SQR(mx%*mx%+my%*my%)
 1990 A=ASN(R/penlen%)
 2000 B=FNpol(mx%,my%)
 2010 X=mx%
 2020 Y=my%
 2030 Z=-penlen%*COS(A)
 2040 PROCdraw
 2050 PROCswap
 2060 SYS "OS_SpriteOp",34+256,spr,"backg",-290,-512,0
 2070 UNTIL (b% AND 4)=0
 2080 vx=X-vx
 2090 vy=Y-vy
 2100 ENDPROC
 2110 :
 2120 DEF FNpol(X,Y)
 2130 IF X=0 AND Y>0 THEN =PI/2
 2140 IF X=0 THEN =-PI/2
 2150 IF X>0 THEN =ATN(Y/X) ELSE =PI+ATN(Y/X)
 2160 :
 2170 DEF PROCbackground
 2180 PROCrot(SIN(RAD(rot%))*1000,COS(RAD(rot%))*1000,alt%)
 2190 PROCinstruc
 2200 S(0)=-350-80
 2210 GCOL 9
 2220 PROCplot( 4,-lim,-lim,  0)
 2230 PROCplot( 4, lim,-lim,  0)
 2240 PROCplot(85,-lim,-lim,-40)
 2250 PROCplot(85, lim,-lim,-40)
 2260 PROCplot( 4,-lim,-lim,  0)
 2270 PROCplot( 4,-lim, lim,  0)
 2280 PROCplot(85,-lim,-lim,-40)
 2290 PROCplot(85,-lim, lim,-40)
 2300 PROCplot( 4, lim,-lim,  0)
 2310 PROCplot( 4, lim, lim,  0)
 2320 PROCplot(85, lim,-lim,-40)
 2330 PROCplot(85, lim, lim,-40)
 2340 GCOL 1
 2350 PROCplot( 4,-lim,-lim,  0)
 2360 PROCplot( 4, lim,-lim,  0)
 2370 PROCplot(85,-lim, lim,  0)
 2380 PROCplot(85, lim, lim,  0)
 2390 GCOL 4
 2400 PROCellip( lim/3, lim/3,0)
 2410 PROCellip(-lim/3,-lim/3,0)
 2420 PROCellip( lim/3,-lim/3,0)
 2430 PROCellip(-lim/3, lim/3,0)
 2440 GCOL 9
 2450 PROCplot(4,0,0,0)
 2460 PROCplot(4,-30,lim,0)
 2470 PROCplot(85,30,lim,0)
 2480 S(0)=penlen%-350
 2490 GCOL 10
 2500 PROCplot(85,-30,lim,0)
 2510 PROCplot(85,30,lim,0)
 2520 GCOL 2
 2530 PROCplot(85,0,0,0)
 2540 SYS "OS_SpriteOp",16+256,spr,"backg",0,-290,-512,290,512
 2550 ENDPROC
 2560 :
 2570 DEF PROCrot(vx,vy,vz)
 2580 LOCAL R,r
 2590 R=SQR(vx*vx+vy*vy+vz*vz)
 2600 r=SQR(vx*vx+vy*vy)
 2610 rinf=R+1500
 2620 Ry(0,2)=  r/R
 2630 Ry(2,2)= vz/R
 2640 Ry(0,0)=-vz/R
 2650 Ry(2,0)=  r/R
 2660 Rz(0,2)= vx/r
 2670 Rz(1,2)= vy/r
 2680 Rz(0,1)=-vy/r
 2690 Rz(1,1)= vx/r
 2700 ENDPROC
 2710 :
 2720 DEF PROCplot(K,X(2),X(1),X(0))
 2730 LOCAL A
 2740 X()=S()+X()
 2750 X()=Rz().X()
 2760 X()=Ry().X()
 2770 A=sxs/(tanB*(rinf-X(2)))
 2780 PLOT K,A*X(1),A*X(0)
 2790 ENDPROC
 2800 :
 2810 DEF PROCcirc(X(2),X(1),X(0))
 2820 LOCAL A
 2830 X()=S()+X()
 2840 X()=Rz().X()
 2850 X()=Ry().X()
 2860 A=sxs/(tanB*(rinf-X(2)))
 2870 CIRCLE FILL A*X(1),A*X(0),(A*30) AND &FFFE
 2880 ENDPROC
 2890 :
 2900 DEF PROCellip(X(2),X(1),X(0))
 2910 LOCAL A
 2920 X()=S()+X()
 2930 X()=Rz().X()
 2940 X()=Ry().X()
 2950 A=sxs/(tanB*(rinf-X(2)))
 2960 ELLIPSE FILL A*X(1),A*X(0),A*30,A*16
 2970 ENDPROC
 2980 :
 2990 DEF PROCswap
 3000 WAIT
 3010 SYS "OS_Byte",112,bank%
 3020 bank%=bank% EOR 3
 3030 SYS "OS_Byte",113,bank%
 3040 ENDPROC
 3050 :
 3060 DEF PROCerror
 3070 ON ERROR OFF
 3080 *FX 4
 3090 *FX 112,0
 3100 *FX 113,0
 3110 COLOUR 7
 3120 REPORT:PRINT;" at line ";ERL
 3130 ENDPROC
```

Font Designer

Listing 1

```
   10 REM FontDesign (FontDes1)
   20 REM by James Richards
   30 REM for B/B+/M/C/E/A
   40 REM (C) BAU Oct 1991
   50 :
   60 adfs%=TRUE  :REM Make FALSE if using DFS or TAPE
   70 dfs%=FALSE  :REM Make TRUE if using DFS, and make adfs% and tape% FALSE
   80 tape%=FALSE :REM Make TRUE if using TAPE, and make dfs% and adfs% FALSE
   90 IF tape%=TRUE THEN *TAPE
  100 IF adfs%=TRUE THEN *ADFS
  110 IF dfs%=TRUE  THEN *DISC
  120 error%=FALSE
  130 ON ERROR PROCerror
  140 IF adfs%=TRUE THEN *DIR $.Fontdata
  150 IF dfs%=TRUE THEN *DIR F
  160 :
  170 MODE4
  180 PROCinit
  190 REPEAT
  200 REPEAT
  210 PROCarrow
  220 up%=FALSE
  230 down%=FALSE
  240 left%=FALSE
  250 right%=FALSE
  260 kp%=FALSE
  270 return%=FALSE
  280 REPEAT
  290 IF INKEY(-1) THEN s%=32 ELSE s%=8
  300 IF INKEY(-98) THEN left%=TRUE:kp%=TRUE
  310 IF INKEY(-67) THEN right%=TRUE:kp%=TRUE
  320 IF INKEY(-73) THEN up%=TRUE:kp%=TRUE
  330 IF INKEY(-105) THEN down%=TRUE:kp%=TRUE
  340 IF INKEY(-74) THEN return%=TRUE:kp%=TRUE
  350 UNTIL kp%=TRUE
  360 PROCarrow
  370 IF left%=TRUE THEN cx%=cx%-s%
  380 IF right%=TRUE THEN cx%=cx%+s%
  390 IF up%=TRUE THEN cy%=cy%+s%
  400 IF down%=TRUE THEN cy%=cy%-s%
  410 IF return%=TRUE THEN PROCtranslate
  420 IF cx%<0 THEN cx%=1248
  430 IF cy%<32 THEN cy%=1024
  440 IF cx%>1248 THEN cx%=0
  450 IF cy%>1024 THEN cy%=32
  460 UNTIL FALSE
  470 :
  480 DEF PROCarrow
  490 GCOL 3,1
  500 VDU 5
  510 MOVE cx%,cy%
  520 VDU 225
  530 VDU 4
  540 GCOL 0,1
  550 ENDPROC
  560 :
  570 DEF PROCtranslate
```

```
580 SOUND1,-15,100,1
590 rx%=cx%
600 ry%=cy%
610 cx%=cx% DIV 32
620 cy%=31-(cy% DIV 32)
630 IF cx%>25 AND cx%<31 AND cy%>2 AND cy%<22 THEN PROCletters
640 IF cx%>9 AND cx%<18 AND cy%>8 AND cy%<17 THEN PROCbigchar
650 IF cx%>4 AND cx%<11 AND cy%>2 AND cy%<6 PROCload:CLS:VDU26:PROCenlarge
660 IF cx%>16 AND cx%<23 AND cy%>2 AND cy%<6 THEN PROCsave:CLS:VDU26
670 IF cx%=6 AND cy%=20 THEN PROCwipe
680 IF cx%=9 AND cy%=20 THEN PROCfill
690 IF cx%=5 AND cy%=13 THEN PROCcopyascii
700 IF cx%>16 AND cx%<23 AND cy%>18 AND cy%<22 THEN PROCfont:CLS:VDU26
710 cx%=rx%
720 cy%=ry%
730 ENDPROC
740 :
750 DEF PROCletters
760 x%=cx%
770 y%=cy%
780 PROCcalascii
790 PROCenlarge
800 ENDPROC
810 :
820 DEF PROCbigchar
830 VDU 5
840 blockx%=cx%*32
850 blocky%=1020-(cy%*32)
860 GCOL3,1
870 px%=x%*32+(((rx%-316) DIV 32)*4)
880 py%=(1024-((y%+1)*32))-(((476-ry%) DIV 32)*4)
890 MOVE blockx%,blocky%
900 VDU 224
910 PLOT 69,px%,py%
920 VDU 4
930 GCOL0,1
940 ENDPROC
950 :
960 DEF PROCcalascii
970 char%=32+((x%-26)+((y%-3)*5))
980 PRINTTAB(5,13);CHR$(char%);
990 ENDPROC
1000 :
1010 DEF PROCenlarge
1020 textx%=10
1030 texty%=9
1040 pointx%=x%*32
1050 pointy%=1020-(y%*32)
1060 REPEAT
1070 REPEAT
1080 IF POINT(pointx%,pointy%)=1 THEN PRINTTAB(textx%,texty%);CHR$(224);
1090 IF POINT(pointx%,pointy%)=0 THEN PRINTTAB(textx%,texty%);CHR$(32);
1100 textx%=textx%+1
1110 pointx%=pointx%+4
1120 UNTIL textx%=18
1130 textx%=10
1140 pointx%=x%*32
1150 pointy%=pointy%-4
1160 texty%=texty%+1
1170 UNTIL texty%=17
1180 ENDPROC
1190 :
1200 DEF PROCwipe
1210 GCOL 0,128
1220 VDU 24,320;480;572;732;
1230 CLG
1240 PRINTTAB(x%,y%);CHR$(32)
1250 VDU 26
1260 ENDPROC
1270 :
1280 DEF PROCfill
1290 GCOL 0,129
1300 VDU 24,320;480;572;732;
1310 CLG
1320 PRINTTAB(x%,y%);CHR$(224)
1330 VDU 26
1340 ENDPROC
1350 :
1360 DEF PROCcopyascii
1370 PRINTTAB(x%,y%);CHR$(char%)
1380 PROCenlarge
1390 ENDPROC
1400 :
1410 DEF PROCinit
1420 VDU 23;8202;0;0;0;
1430 ?&72=170
1440 ?&73=85
1450 DIM Q% 100
1460 FOR pass=0 TO 2 STEP2
1470 P%=Q%
1480 [OPT pass
1490 .start
1500 LDA #&58
1510 STA &71
1520 LDA #&00
1530 STA &70
1540 LDY #&00
1550 :
1560 .repeat
1570 LDA &72
1580 STA (&70),Y
1590 INC &70
1600 LDA &73
1610 STA (&70),Y
1620 INC &70
1630 LDA #&00
1640 CMP &70
1650 BNE repeat
1660 INC &71
1670 LDA #&80
1680 CMP &71
1690 BNE repeat
1700 RTS
1710 ]
1720 NEXT pass
1730 CALL start
1740 VDU 23,224,&FF,&FF,&FF,&FF,&FF,&FF,&FF,&FF
1750 VDU 23,225,&C0,&F0,&6C,&50,&28,&24,&02,&01
1760 VDU 23,226,&FF,&81,&81,&81,&81,&81,&81,&FF
1770 :
1780 GCOL 0,1
1790 MOVE 612,772
1800 MOVE 284,444
1810 PLOT 85,612,444
1820 GCOL 0,0
1830 MOVE 612,772
1840 MOVE 284,444
1850 PLOT 85,284,772
1860 MOVE 580,476
1870 MOVE 580,740
1880 PLOT 85,316,476
1890 :
1900 GCOL 0,1
1910 MOVE 316,476
1920 DRAW 316,740
1930 DRAW 580,740
1940 MOVE 284,772
1950 DRAW 612,772
1960 DRAW 612,444
1970 DRAW 284,444
1980 DRAW 284,772
1990 :
2000 GCOL 0,0
2010 MOVE 616,768
2020 DRAW 616,440
2030 DRAW 288,440
2040 MOVE 612,444
2050 DRAW 580,476
2060 GCOL 0,1
2070 MOVE 284,772
2080 PLOT 22,316,740
2090 :
2100 FOR loop%=32 TO 64 STEP4
2110 GCOL 0,1
2120 MOVE loop%,loop%+192
2130 DRAW loop%,1024-loop%
2140 DRAW 1100-loop%,1024-loop%
2150 GCOL 0,0
2160 DRAW 1100-loop%,loop%+192
2170 DRAW loop%,loop%+192
2180 NEXT loop%
2190 :
2200 GCOL 0,0
2210 MOVE 68,260
2220 DRAW 68,960
2230 DRAW 1036,960
2240 MOVE 68,960
2250 DRAW 68,960
2260 MOVE 64,960
2270 DRAW 32,992
2280 GCOL 0,1
2290 MOVE 1032,956
2300 DRAW 1032,260
2310 DRAW 68,260
2320 MOVE 1032,260
2330 PLOT 22,1068,224
2340 GCOL 0,128
2350 VDU 24,828;316;996;932;
2360 :
2370 CLG
2380 VDU 26
2390 GCOL 0,1
2400 MOVE 828,316
2410 DRAW 828,932
2420 DRAW 996,932
2430 PRINTTAB(5,13);CHR$(32)
2440 GCOL 0,1
2450 MOVE 156,576
2460 DRAW 156,608
2470 DRAW 192,608
2480 :
2490 PROCwindow(5,5,10,3)
2500 PROCwindow(17,5,22,3)
2510 PROCwindow(5,21,10,19)
2520 PROCwindow(17,21,22,19)
2530 :
2540 COLOUR0:COLOUR129
2550 PRINTTAB(6,4);"Load"
2560 PRINTTAB(18,4);"Save"
2570 PRINTTAB(6,20);CHR$(224)
2580 PRINTTAB(9,20);CHR$(226)
2590 PRINTTAB(18,20);"Font"
2600 COLOUR1:COLOUR128
2610 :
2620 PROCchars
2630 cx%=832
2640 cy%=928
2650 x%=26
2660 y%=3
2670 PROCcalascii
2680 PROCtranslate
2690 ENDPROC
2700 :
2710 DEF PROCchars
2720 char%=32
2730 FOR chary%=3 TO 21
2740 FOR charx%=26 TO 30
2750 PRINTTAB(charx%,chary%);CHR$(char%);
2760 char%=char%+1
2770 NEXT charx%
2780 NEXT chary%
2790 ENDPROC
2800 :
2810 DEF PROCwindow(wx%,wy%,wx1%,wy1%)
2820 COLOUR 128
2830 VDU 28,wx%+1,wy%+1,wx1%+1,wy1%+1
2840 CLS
2850 VDU 26
2860 VDU 28,wx%,wy%,wx1%,wy1%
2870 COLOUR 129
2880 CLS
2890 GCOL 0,0
2900 wx%=wx%*32
2910 wy%=(31-wy%)*32
2920 wx1%=(wx1%+1)*32
2930 wy1%=(31-wy1%+1)*32
2940 MOVE wx%,wy%
2950 DRAW wx1%,wy%
2960 DRAW wx1%,wy1%
2970 DRAW wx%,wy1%
2980 DRAW wx%,wy%
2990 VDU 26
3000 COLOUR 128
3010 GCOL 0,1
3020 ENDPROC
3030 :
3040 DEF PROCload
3050 VDU 28,0,31,39,26
3060 CLS
3070 IF tape%=TRUE THEN OSCLI "FX21,0":INPUT"Filename : "file$:PRINT"Searching":PROCloadfile(file$):ENDPROC
3080 PRINT"Load font : Catalogue ?";
3090 *FX21,0
3100 key$=GET$
3110 add%=TRUE
3120 IF key$="Y" THEN add%=FALSE:VDU14:*CAT
3130 IF key$="N" THEN add%=FALSE
3140 IF ASC(key$)=13 THEN PROCdelay(20):ENDPROC
3150 VDU15
3160 PRINT''"Filename : ";
3170 IF add%=TRUE THEN PRINT;key$;
3180 INPUT""file$
3190 IF file$="" THEN PROCdelay(20):ENDPROC
3200 IF add%=TRUE THEN file$=key$+file$
3210 IF LEN(file$)>10 THEN add%=FALSE:GOTO 3160
3220 len%=FNlen(file$)
3230 IF len%=0 THEN PRINT''"Sorry, file does not exist.":PROCdelay(200):ENDPROC
3240 PROCloadfile(file$)
3250 ENDPROC
3260 :
3270 DEF PROCsave
3280 VDU 28,0,31,39,26
3290 CLS
3300 IF tape%=TRUE THEN OSCLI "FX21,0":INPUT"Filename : "file$:PROCsavefile(file$):ENDPROC
3310 PRINT"Save font : Catalogue ?";
3320 *FX 21,0
3330 key$=GET$
3340 add%=TRUE
3350 IF key$="Y" THEN add%=FALSE:VDU14:*CAT
3360 IF key$="N" THEN add%=FALSE
3370 IF ASC(key$)=13 THEN ENDPROC
3380 VDU15
3390 PRINT''"Filename : ";
3400 IF add%=TRUE THEN PRINT;key$;
3410 INPUT""file$
3420 IF file$="" THEN PROCdelay(20):ENDPROC
3430 IF add%=TRUE THEN file$=key$+file$
3440 IF LEN(file$)>10 THEN add%=FALSE:GOTO 3390
3450 len%=FNlen(file$)
3460 IF len%<>0 THEN PRINT''"File exists, carry on ?":OSCLI "FX21,0":key$=GET$:IF key$="N" THEN ENDPROC
3470 IF adfs%=TRUE AND len%>0 THEN OSCLI "ACCESS "+file$+" WR"
3480 IF dfs%=TRUE AND len%>0 THEN OSCLI "ACCESS "+file$
3490 PROCsavefile(file$)
3500 ENDPROC
3510 :
3520 DEF PROCsavefile(filename$)
3530 outfile%=OPENOUT filename$
3540 FOR ady%=&5BC0 TO &7240 STEP &140
3550 FOR adx%=&D0 TO &F7
3560 byte%=adx%?ady%
3570 BPUT #outfile%,byte%
3580 NEXT adx%
3590 NEXT ady%
3600 CLOSE #outfile%
3610 ENDPROC
3620 :
3630 DEF PROCloadfile(filename$)
3640 infile%=OPENIN filename$
3650 FOR ady%=&5BC0 TO &7240 STEP&140
3660 FOR adx%=&D0 TO &F7
3670 byte%=BGET #infile%
3680 adx%?ady%=byte%
3690 NEXT adx%
3700 NEXT ady%
3710 CLOSE #infile%
3720 ENDPROC
3730 :
3740 DEF FNlen(filename$)
3750 in%=OPENIN filename$
3760 len%=EXT #in%
3770 CLOSE #in%
3780 =len%
3790 :
3800 DEF PROCdelay(t%)
3810 now%=TIME
3820 REPEAT UNTIL TIME-now%>t%
3830 ENDPROC
3840 :
3850 DEF PROCerror
3860 IF ERR=17 THEN CLEAR:RUN
3870 CLOSE #0
3880 IF adfs%=TRUE THEN *DIR $.FontDesign
3890 IF dfs%=TRUE THEN *DIR
3900 VDU19,1,1;0;
3910 IF error%=TRUE THEN PROCbeenhere
3920 error%=TRUE
3930 VDU28,0,31,39,22
3940 CLS
3950 PRINT"Do you wish me to attempt to rescue the current font (Y/N)"
3960 *FX21,0
3970 key$=GET$
3980 IF key$="Y" THEN PROCsavefile("Emergency")
3990 PROCreport
4000 :
4010 DEF PROCreport
4020 VDU26
4030 CLS
4040 PRINT'''
4050 REPORT:PRINT;" at line ";ERL
4060 PRINT'''
4070 OSCLI "KEY 0 LIST "+STR$(ERL)+"|M"
4080 *FX138,0,128
4090 END
4100 :
4110 DEF PROCbeenhere
4120 CLS
4130 VDU7
4140 PRINT"The error has occured again so it must  be in either the save routine or the    actual error routine, or alternativly itis a disc error."
4150 PRINT"Please check these procedures then pressfunction 0."
4160 *KEY 0 PROCsavefile("Emergency")|M
4170 REPORT:PRINT;" at line ";ERL
4180 END
4190 :
4200 DEF PROCfont
4210 VDU 26
4220 VDU 28,0,31,39,26
4230 *FX21,0
4240 CLS
4250 PRINT"This icon will destroy the current font."
4260 PRINT"Are you sure you wish to use it ?"
4270 key$=GET$
4280 IF key$<>"Y" THEN ENDPROC
4290 VDU 26
4300 CLS
4310 PRINT''
4320 IF adfs%=TRUE THEN *DIR $.FontData
4330 IF dfs%=TRUE THEN *DIR F
4340 IF tape%=FALSE THEN *CAT
4350 PRINT''
4360 IF tape%=TRUE THEN len%=&FFFF:INPUT"Filename : "dfile$:GOTO 4480
4370 *FX 21,0
4380 REPEAT
4390 exit%=TRUE
4400 INPUT"Filename of source data : "dfile$
4410 IF dfile$="" THEN CLEAR:RUN
4420 IF LEN(dfile$)>10 THEN exit%=FALSE:UNTIL exit%=TRUE
4430 len%=FNlen(dfile$)
4440 IF len%=0 THEN PRINT"File does not exist.":exit%=FALSE
4450 UNTIL exit%=TRUE
4460 IF adfs%=TRUE THEN *DIR $.Library
4470 IF dfs%=TRUE THEN *DIR L
4480 CLS
4490 PRINT''
4500 IF tape%=FALSE THEN *CAT
4510 PRINT''
4520 IF tape%=TRUE THEN INPUT"Filename for font : "dfile1$:GOTO 4610
4530 REPEAT
4540 exit%=TRUE
4550 INPUT"Filename of object data : "dfile1$
4560 IF dfile1$="" THEN CLEAR:RUN
4570 IF LEN(dfile1$)>10 THEN exit%=FALSE:UNTIL exit%=TRUE
4580 len%=FNlen(dfile1$)
4590 IF len%<>0 THEN PRINT"File exists, carry on ?":OSCLI "FX21,0":key$=GET$:IF key$="N" THEN exit%=FALSE
4600 UNTIL exit%=TRUE
4610 CLS
4620 FOR pass=0 TO 2 STEP2
4630 P%=&7C40
4640 [OPT pass
4650 .init
4660 LDA #&14
```

```
4670 LDX #6
4680 LDY #&00
4690 JSR &FFF4
4700 LDA #data MOD 256
4710 STA &70
4720 LDA #data DIV 256
4730 STA &71
4740 LDA #32
4750 STA &73
4760 LDA #&00
4770 STA &74
4780 :
4790 .loop
4800 JSR define
4810 INC &73
4820 LDA &73
4830 CMP #128
4840 BEQ done
4850 JMP loop
4860 :
4870 .define
4880 CLC
4890 LDA #23
4900 JSR &FFEE
4910 LDA &73
4920 JSR &FFEE
4930 LDY #&00
4940 :
4950 .loop1
4960 LDA (&70),Y
4970 JSR &FFEE
4980 INY
4990 CPY #8
5000 BNE loop1
5010 LDA &70
5020 ADC #7
5030 STA &70
5040 BCC return
5050 INC &71
5060 :
5070 .return
5080 RTS
5090 .done
5100 LDX #key MOD 256
5110 LDY #key DIV 256
5120 JSR &FFF7
5130 LDA #&8A
5140 LDX #&00
5150 LDY #&80
5160 JSR &FFF4
5170 RTS
5180 :
5190 .key
5200 EQUS "KEY 0 |Z|L|V6REM   Font Inst
alled PAGE Raised to PAGE+&600|MPAGE=PAG
E+&600|MNEW|MEND|M*BASIC|M"+CHR$(&0D)
5210 .data
5220 ]
5230 NEXT pass
5240 IF adfs%=TRUE THEN *DIR $.FontData
5250 IF dfs%=TRUE THEN *DIR F
5260 OSCLI "LOAD "+dfile$+" "+STR$~(dat
a)
5270 IF adfs%=TRUE THEN *DIR $.Library
5280 IF dfs%=TRUE THEN *DIR L
5290 length%=data+&2F8
5300 IF tape%=FALSE THEN len%=FNlen(dfi
le1$)
5310 IF adfs%=TRUE THEN IF len%>0 THEN
OSCLI "ACCESS "+dfile1$+" WR"
5320 IF dfs%=TRUE AND len%>0 THEN OSCLI
"ACCESS "+dfile1$
5330 IF tape%=FALSE THEN OSCLI "SAVE "+
dfile1$+" 7C40 "+STR$~(length%)
5340 IF tape%=TRUE THEN OSCLI "SAVE "+d
file1$+" 7C40 "+STR$~(length%)
5350 CLS
5360 PRINT"ReRun (Y/N)"
5370 *FX21,0
5380 key$=GET$
5390 IF key$="Y" THEN CLEAR:RUN
5400 *KEY 10
5410 CALL !-4
```

Pieces of Eight

Listing 1

```
10 REM >Spooler - The Train Game '91
(Po81)
20 REM By Dave Lawrence
30 REM For BBC B/B+/M/C/E/A+65Tube
40 REM (C) BAU October 1991
50 :
60 MODE 1:PROCtitles:PROCinfo
70 PROCstation:PROCchars
80 END
90 :
100 DEF PROCtitles
110 *Spool TitleVs
120 CLS:COLOUR 129:COLOUR 2
130 PRINTTAB(5,1);" T h e   T r a i n
 G a m e "'
140 COLOUR 128:COLOUR 3:PRINTTAB(4,3);
"Original version by ";:COLOUR 2:PRINT"P
eter Balch";
150 COLOUR 3:PRINTTAB(6,4);"1991 remix
 by ";:COLOUR 2:PRINT"Dave Lawrence";
160 COLOUR 1:PRINTTAB(9,5);"(C) 1984 a
nd 1991 BAU";
170 COLOUR 2:PRINTTAB(8,8);"Today's Hi
ghest Profits";
180 COLOUR 3:PRINTTAB(7,9);"————
—————-";
190 COLOUR 2:PRINTTAB(5,11);"- Contro
ller -        ";CHR$249;"  s  d";
200 COLOUR 3
210 *Spool
220 ENDPROC
230 :
240 DEF PROCinfo
250 top=6:CLS
260 *Spool InfoVs
270 PROCbox(7,top+18,33,top)
280 COLOUR 0:PRINTTAB(26,top);CHR$249"
 s  d";
290 PRINTTAB(7,top+2); "Fares collecte
d";
300 PRINTTAB(7,top+4); "Efficiency bon
us";
310 PRINTTAB(7,top+6); "Costs incurred
";
320 PRINTTAB(7,top+12);"Balance";
330 PRINTTAB(24,top+8);"————";
340 PRINTTAB(24,top+14);"==========";
350 PRINTTAB(24,top+18);"==========";
360 PRINTTAB(7,top+10);"Net ";
370 *Spool
380 COLOUR 128
390 ENDPROC
400 :
410 DEF PROCbox(x1,y1,x2,y2)
420 VDU 28,x1-1,y1+1,x2+1,y2-1,12,26
430 COLOUR 131:VDU 28,x1,y1,x2,y2,12,2
6
440 x1=x1*32:x2=x2*32:y1=1023-y1*32:y2
=1023-y2*32
450 GCOL 0,3
460 FOR b=0 TO 24 STEP 8
470 MOVE x1-4-b ,y1-32-b:DRAW x2+32+b,
y1-32-b
480 DRAW x2+32+b,y2+4+b:DRAW x1-4-b ,y
2+4+b
490 DRAW x1-4-b ,y1-32-b
500 NEXT
510 ENDPROC
520 :
530 DEF PROCstation
540 CLS:MOVE 640,512
550 *Spool StatVs
560 GCOL 0,2
570 PLOT 0,0,-3*32+8:PLOT 0,0,5*4
580 PLOT 81,5*32-4,-5*4:PLOT 81,0,5*4
590 PLOT 0,-5*32+4,2*32-4-5*4:PLOT 0,5
*4,5*4
600 PLOT 81,4*32-12+5*4,-5*4:PLOT 81,-
5*4,5*4
610 GCOL 0,3:PLOT 0,-25*4,-12
620 PLOT 0,0,5*4:PLOT 81,21*4,-5*4
630 PLOT 81,0,5*4:GCOL 0,1
640 PLOT 0,-22*4,8:PLOT 0,5*4,5*4
650 PLOT 81,5*4,-5*4:PLOT 0,12,0
660 PLOT 0,5*4,5*4:PLOT 81,5*4,-5*4
670 PLOT 0,0,-4:PLOT 1,-23*4,0
680 *Spool
690 ENDPROC
700 :
710 DEF PROCchars
720 *Spool Chars
730 VDU 22,1:char=224
740 READ vdu
750 REPEAT
760 VDU 23,char,vdu
770 FOR i=1 TO 7:READ vdu:VDU vdu:NEXT
780 char=char+1:READ vdu
790 UNTIL vdu=-1
800 VDU 254:*Spool
810 ENDPROC
820 :
830 REM 13 Track pieces
840 DATA 8,6,12,4,4,3,6,1
850 DATA 8,28,8,8,8,28,8,8
860 DATA 8,48,24,16,32,192,96,128
870 DATA 1,6,3,4,4,12,6,8
880 DATA 3,3,4,24,24,32,192,192
890 DATA 5,78,122,160,0,0,0,0
900 DATA 0,0,0,5,6,90,96,160
910 DATA 0,0,68,255,68,0,0,0
920 DATA 208,50,46,5,0,0,0,0
930 DATA 0,0,0,160,96,90,6,5
940 DATA 192,192,32,24,24,4,3,3
950 DATA 129,66,36,24,24,36,66,129
960 DATA 128,96,192,32,16,24,48,8
970 :
980 REM 8 Trains
990 DATA 28,20,28,20,62,62,62,34
1000 DATA 16,14,103,239,191,120,120,152
1010 DATA 2,226,98,255,255,102,0,0
1020 DATA 152,108,120,241,250,30,30,28
1030 DATA 34,62,62,62,20,28,20,28
1040 DATA 25,54,30,143,95,120,120,56
1050 DATA 64,71,70,255,255,102,0,0
1060 DATA 8,112,230,247,253,30,30,25
1070 :
1080 REM Man, Tree, Roof, House, Pound,
Block, L&R of clock
1090 DATA 0,24,0,60,24,24,24,0
1100 DATA 0,8,42,28,73,42,28,8
1110 DATA 0,0,0,24,60,126,255,255
1120 DATA 126,126,126,126,126,0,0,0
1130 DATA 28,54,48,124,48,48,126,0
1140 DATA 255,255,255,255,255,255,255,2
55
1150 DATA 1,3,3,3,3,3,3,1
1160 DATA 128,192,192,192,192,192,192,1
28
1170 :
1180 DATA -1
```

Listing 2

```
10 REM >Core - The Train Game '91 (Po
82)
20 REM By Dave Lawrence
30 REM For BBC B/B+/M/C/E/A+65Tube
40 REM (C) BAU October 1991
50 :
60 REM Initialisation
70 :
80 IF PAGE<>&3000 THEN PAGE=&3000:CHA
IN "Core"
90 :
100 MODE 7:LOMEM=&5E00
110 top%=TOP-2
120 :
130 code%=&1100:zp=0
140 :
150 towns=5
160 stock=4
170 names=8
180 boardx=40
190 boardy=32
200 :
210 ticket=6
220 compensation=4
230 traincost=298
240 firstbonus=4*240
250 :
260 people_per_round=5:maximum_people=
200
270 start_speed=15:speed_increase=1
280 fastest_speed=7:start_gap=70
290 gap_increase=10:smallest_gap=20
300 start_delay=30:delay_increase=5
310 shortest_delay=10
320 :
330 start_clock=6:start_eta=12
340 track_char=224:tree_char=246
350 roof_char=247:house_char=248
360 town=FNzp(1):setx=FNzp(1)
370 sety=FNzp(1):xcount=FNzp(1)
380 ycount=FNzp(1):xtemp=FNzp(1)
390 ytemp=FNzp(1):trackx=FNzp(1)
400 tracky=FNzp(1):in=FNzp(1)
410 out=FNzp(1):out2=FNzp(1)
420 wrong=FNzp(2):temp=FNzp(1)
430 nx=FNzp(1):ny=FNzp(1)
440 goback=FNzp(2):key=FNzp(1)
450 new=FNzp(1):maxrand=FNzp(1)
460 rd=FNzp(5):fixrd=FNzp(4)
470 trains=FNzp(1):inplay=FNzp(1)
480 onsheet=FNzp(1):extras=FNzp(1)
490 maxpas=FNzp(1):playspeed=FNzp(1)
500 traingap=FNzp(1):delay=FNzp(1)
510 train=FNzp(1):control=FNzp(1)
520 timer=FNzp(1):minutes=FNzp(1)
530 hours=FNzp(1):frames=FNzp(1)
540 pop=FNzp(2):safe=FNzp(2)
550 revtr=FNzp(1):wrp=FNzp(2)
560 peeky=FNzp(1):at=FNzp(1)
570 to=FNzp(1):lastto=FNzp(1)
580 number=FNzp(2):wait=FNzp(1)
590 dflag=FNzp(1):dest=FNzp(1)
600 died=FNzp(1):xc=FNzp(2)
610 yc=FNzp(2):round=FNzp(1)
620 name=FNzp(1):lsdno=FNzp(2)
630 pence=FNzp(1):shillings=FNzp(1)
640 pounds=FNzp(1):fares=FNzp(3)
650 costs=FNzp(3):total=FNzp(2)
660 net=FNzp(2):bonusat=FNzp(2)
670 highslot=FNzp(1):bcol=FNzp(1)
680 visit=FNzp(towns):eta=FNzp(1)
690 regy=FNzp(1)
700 osrdch=&FFE0
710 oswrch=&FFEE
720 osword=&FFF1
730 osbyte=&FFF4
740 oscli=&FFF7
750 :
760 PRINT"Assembling code..."
770 FOR pass%=0 TO 2 STEP 2
780 P%=code%
790 FOR part%=1 TO 8
800 OSCLI"Load Part"+STR$part%+" "+STR
$~top%
810 PRINT"Part ";part%;", pass ";pass%
;CHR$13;
820 GOSUB 2020
830 NEXT
840 end%=P%
850 NEXT
860 :
870 FOR i%=0 TO boardy-1
880 a%=board+i%*40
890 mul40lo?i%=a% MOD 256
900 mul40hi?i%=a% DIV 256
910 NEXT
920 FOR piece=1 TO 13
930 FOR in=0 TO 7
940 READ out
950 exittab?((piece-1)*8+in)=out
960 NEXT
970 NEXT
980 FOR i=0 TO towns-1
990 READ x,y
1000 townx?i=x:towny?i=y
1010 multowns?i=i*towns
1020 NEXT
1030 READ x,y
1040 ?shedx=x:?shedy=y
1050 FOR i=0 TO names-1
1060 READ name$,ls,ss,ds
1070 name$=LEFT$(name$+STRING$(16,CHR$1
3),16)
1080 FOR j=0 TO 15
1090 hinames?(i*16+j)=ASCMID$(name$,j+1
,1)
1100 NEXT
1110 p=ls*240+ss*12+ds
1120 hiscores?(i*2)=p MOD 256
1130 hiscores?(i*2+1)=p DIV 256
1140 NEXT
1150 FOR pass%=0 TO 2 STEP 2
1160 P%=board:go%=P%
1170 PROCvdus("Chars")
1180 [OPT pass%
1190 LDA #0
1200 JSR cursor
1210 LDA #225
1220 LDX #140
1230 LDY #0
1240 STY total
1250 STY total+1
1260 STY bcol
1270 JSR osbyte
1280 LDA #226
1290 LDX #150
1300 LDY #0
1310 JSR osbyte
1320 LDA #229
1330 LDX #1
1340 JSR osbyte
1350 LDX #envl MOD 256
1360 LDY #envl DIV 256
1370 LDA #8
1380 JSR osword
1390 JMP code%
1400 :
1410 .envl
1420 EQUB 1:EQUB 1
1430 EQUB 0:EQUB 0:EQUB 0
1440 EQUB 0:EQUB 0:EQUB 0
1450 EQUB 126:EQUB 0:EQUB -1:EQUB -2
1460 EQUB 100:EQUB 80
1470 ]
1480 NEXT
1490 OSCLI"Save Trains "+STR$~code%+" "
+STR$~end%+" "+STR$~go%
1500 PRINT'"Code size : ";end%-code%
1510 PRINT"Bytes free: ";&3000-end%
1520 END
1530 :
1540 DEF FNzp(size)
1550 zp=zp+size
1560 =zp-size
1570 :
1580 DEF FNdef(size)
1590 P%=P%+size
1600 =P%-size
1610 :
1620 DEF PROCvdus(vdus$)
1630 [OPT pass%:JSR writes:]
1640 f%=OPENIN(vdus$)
1650 l%=EXT#f%
1660 CLOSE #f%
1670 a%=FNdef(l%)
1680 IF pass%=2 PROCload(vdus$,a%)
1690 [OPT pass%:EQUB 254:]
1700 ENDPROC
1710 :
1720 DEF PROCload(file$,addr)
1730 OSCLI("Load "+file$+" "+STR$~addr)
1740 ENDPROC
1750 :
1760 DATA 3,-1,-1,0,-1,-1,-1,-1
1770 DATA 4,-1,-1,-1,0,-1,-1,-1
1780 DATA 5,-1,-1,-1,-1,0,-1,-1
1790 DATA -1,4,-1,-1,1,-1,-1,-1
1800 DATA -1,5,-1,-1,-1,1,-1,-1
1810 DATA -1,6,-1,-1,-1,-1,1,-1
1820 DATA -1,-1,5,-1,-1,2,-1,-1
1830 DATA -1,-1,6,-1,-1,-1,2,-1
1840 DATA -1,-1,7,-1,-1,-1,-1,2
1850 DATA -1,-1,-1,6,-1,-1,3,-1
1860 DATA -1,-1,-1,7,-1,-1,-1,3
1870 DATA -1,-1,-1,-1,-1,-1,-1,-1
1880 DATA -1,-1,-1,-1,7,-1,-1,4
1890 :
1900 DATA 8,1, 27,4, 10,14, 8,24, 27,27
1910 DATA 29,14
1920 :
1930 DATA Rick Mansworth, 25, 2, 9
1940 DATA Colin Dale,     17,12, 0
1950 DATA Russell Square, 10, 0,11
1960 DATA Warren Street,   9, 3, 3
1970 DATA Stan More,       8, 0, 0
1980 DATA Walt Hamstow,    4,15, 6
1990 DATA Brent Cross,     1,19, 5
2000 DATA Reg Entspark,    0,18, 7
2010 :
```

```
2020 REM Last line
```

Listing 3

```
   10 REM >Part1 - The Train Game '91 (P
o83)
   20 REM By Dave Lawrence
   30 REM For BBC B/B+/M/C/E/A+65Tube
   40 REM (C) BAU October 1991
   50 :
   60 REM Titles, Highscores
   70 :
   80 [OPT pass%
   90 .mainloop
  100 LDY #0
  110 STY highslot
  120 .findslot
  130 LDA total+1
  140 CMP hiscores+1,Y
  150 BCC nextslot
  160 BNE gotslot
  170 LDA total
  180 CMP hiscores,Y
  190 BCC nextslot
  200 BNE gotslot
  210 .nextslot
  220 INC highslot
  230 INY
  240 INY
  250 CPY #names*2
  260 BNE findslot
  270 BEQ nothigh
  280 .gotslot
  290 LDX #names*16
  300 STY ytemp
  310 LDY #names*2
  320 .shuffle
  330 LDA hiscores-2,Y
  340 STA hiscores,Y
  350 LDA hiscores-1,Y
  360 STA hiscores+1,Y
  370 LDA #16
  380 STA xcount
  390 .movename
  400 DEX
  410 LDA hinames,X
  420 STA hinames+16,X
  430 DEC xcount
  440 BNE movename
  450 DEY
  460 DEY
  470 CPY ytemp
  480 BNE shuffle
  490 LDA total
  500 STA hiscores,Y
  510 LDA total+1
  520 STA hiscores+1,Y
  530 LDY #16
  540 LDA #32
  550 .wipename
  560 STA hinames,X
  570 INX
  580 DEY
  590 BNE wipename
  600 .nothigh
  610 LDX #0
  620 LDY #0
  630 JSR vdu19
  640 LDX #2
  650 LDY #3
  660 JSR vdu19
  670 ]
  680 PROCvdus("TitleVs")
  690 [OPT pass%
  700 LDA #0
  710 STA name
  720 .showtable
  730 LDA name
  740 ASL A
  750 ADC #13
  760 STA ypos
  770 LDA name
  780 CLC
  790 ADC #49
  800 STA nnum
  810 JSR writes
  820 EQUB 31:EQUB 3
  830 .ypos EQUB 0
  840 EQUB 17:EQUB 3
  850 .nnum
  860 EQUS "? "
  870 EQUB 17:EQUB 1
  880 EQUB 254
  890 LDA name
  900 ASL A
  910 ASL A
  920 ASL A
  930 ASL A
  940 TAY
  950 LDX #16
  960 .showname
  970 LDA hinames,Y
  980 CMP #13
  990 BEQ nameshown
 1000 JSR oswrch
 1010 INY
 1020 DEX
 1030 BNE showname
 1040 .nameshown
 1050 LDA #32
 1060 JSR oswrch
 1070 DEX
 1080 CPX #250
 1090 BNE nameshown
 1100 LDX #3
 1110 JSR setcol
 1120 LDA name
 1130 ASL A
 1140 TAY
 1150 LDX hiscores,Y
 1160 LDA hiscores+1,Y
 1170 TAY
 1180 JSR lsdtab
 1190 INC name
 1200 LDA name
 1210 CMP #names
 1220 BNE showtable
 1230 LDA highslot
 1240 CMP #names
 1250 BCC prompt
 1260 JMP noinput
 1270 .prompt
 1280 ASL A
 1290 ADC #13
 1300 STA inputy
 1310 JSR writes
 1320 EQUB 31:EQUB 3:EQUB 31
 1330 EQUB 17:EQUB 2
 1340 EQUS "Well done, please enter your
name"
 1350 EQUB 31:EQUB 5
 1360 .inputy EQUB 0
 1370 EQUB 254
 1380 LDA #1
 1390 JSR cursor
 1400 JSR fx15
 1410 LDA highslot
 1420 ASL A
 1430 ASL A
 1440 ASL A
 1450 ASL A
 1460 TAY
 1470 LDX #0
 1480 .input
 1490 JSR osrdch
 1500 CMP #13
 1510 BEQ inpret
 1520 CMP #21
 1530 BEQ inpctu
 1540 CMP #27
 1550 BEQ inpesc
 1560 CMP #127
 1570 BEQ inpdel
 1580 CMP #32
 1590 BCC input
 1600 CMP #128
 1610 BCS input
 1620 CPX #16
 1630 BEQ input
 1640 STA hinames,Y
 1650 JSR oswrch
 1660 INY
 1670 INX
 1680 BNE input
 1690 .inpdel
 1700 JSR delone
 1710 JMP input
 1720 .inpctu
 1730 JSR inpclr
 1740 JMP input
 1750 .inpclr
 1760 JSR delone
 1770 CPX #0
 1780 BNE inpclr
 1790 RTS
 1800 .delone
 1810 CPX #0
 1820 BEQ nodel
 1830 LDA #127
 1840 JSR oswrch
 1850 DEX
 1860 DEY
 1870 LDA #13
 1880 STA hinames,Y
 1890 .nodel
 1900 RTS
 1910 .inpesc
 1920 JSR inpclr
 1930 .inpret
 1940 LDA #0
 1950 JSR cursor
 1960 CPX #0
 1970 BEQ randname
 1980 DEY
 1990 DEX
 2000 LDA #8
 2010 JSR oswrch
 2020 LDA hinames,Y
 2030 CMP #32
 2040 BEQ inpret
 2050 BNE noinput
 2060 .randname
 2070 LDA #4
 2080 JSR randa32
 2090 ASL A
 2100 ASL A
 2110 ASL A
 2120 ASL A
 2130 TAX
 2140 LDA #16
 2150 STA xcount
 2160 .copyesc
 2170 LDA escnames,X
 2180 STA hinames,Y
 2190 JSR oswrch
 2200 INY
 2210 INX
 2220 DEC xcount
 2230 BNE copyesc
 2240 .noinput
 2250 JSR writes
 2260 EQUB 31:EQUB 3:EQUB 31
 2270 EQUB 17:EQUB 2:EQUS "    Press "
 2280 EQUB 17:EQUB 1:EQUS "SPACE "
 2290 EQUB 17:EQUB 2:EQUS "to start game
 "
 2300 EQUB 254
 2310 JSR wfs
 2320 ]
 2330 RETURN
```

Listing 4

```
   10 REM >Part2 - The Train Game '91 (P
o84)
   20 REM By Dave Lawrence
   30 REM For BBC B/B+/M/C/E/A+65Tube
   40 REM (C) BAU October 1991
   50 :
   60 REM Main game loop, End of level
   70 :
   80 [OPT pass%
   90 LDA #stock
  100 STA trains
  110 LDA #0
  120 STA inplay
  130 STA total
  140 STA total+1
  150 STA round
  160 LDA #people_per_round
  170 STA maxpas
  180 LDA #start_speed
  190 STA playspeed
  200 LDA #start_gap
  210 STA traingap
  220 LDA #start_delay
  230 STA delay
  240 LDA #start_eta
  250 STA eta
  260 LDA #firstbonus MOD 256
  270 STA bonusat
  280 LDA #firstbonus DIV 256
  290 STA bonusat+1
  300 .roundloop
  310 LDX #rd MOD 256
  320 LDY #rd DIV 256
  330 LDA #1
  340 JSR osword
  350 LDA round
  360 CMP #16
  370 BCC seteando
  380 LDA playspeed
  390 CMP #fastest_speed
  400 BEQ toofast
  410 SEC
  420 SBC #speed_increase
  430 STA playspeed
  440 .toofast
  450 LDA traingap
  460 CMP #smallest_gap
  470 BEQ toosmall
  480 SEC
  490 SBC #gap_increase
  500 STA traingap
  510 .toosmall
  520 LDA delay
  530 CMP #shortest_delay
  540 BEQ tooshort
  550 SEC
  560 SBC #delay_increase
  570 STA delay
  580 .tooshort
  590 LDA eta
  600 CMP #10
  610 BEQ toosoon
  620 DEC eta
  630 .toosoon
  640 LDX #3
  650 LDY #4
  660 BNE xyiseando
  670 .seteando
  680 AND #3
  690 STA extras
  700 TAX
  710 LDA round
  720 LSR A
  730 LSR A
  740 TAY
  750 INY
  760 .xyiseando
  770 STX extras
  780 STY onsheet
  790 LDA maxpas
  800 CMP #maximum_people
  810 BCS nomorepas
  820 CLC
  830 ADC #people_per_round
  840 STA maxpas
  850 .nomorepas
  860 LDA #0
  870 STA inplay
  880 STA control
  890 STA timer
  900 STA pop
  910 STA pop+1
  920 STA safe
  930 STA safe+1
  940 LDX #5
  950 .clrfc
  960 STA fares,X
  970 DEX
  980 BPL clrfc
  990 STA train
 1000 STA minutes
 1010 LDA #start_clock
 1020 STA hours
 1030 JSR emptytrain
 1040 LDA #255
 1050 LDY #stock-1
 1060 .clrstock
 1070 STA status,Y
 1080 DEY
 1090 BPL clrstock
 1100 .setlevel
 1110 LDA #12
 1120 JSR oswrch
 1130 JSR setbcol
 1140 LDX #2
 1150 LDY #4
 1160 JSR vdu19
 1170 JSR labels
 1180 LDA round
 1190 CLC
 1200 ADC #1
 1210 JSR decimalx0
 1220 JSR showmoney
 1230 JSR info
 1240 JSR makemap
 1250 BCS setlevel
 1260 JSR checkmap
 1270 BPL setlevel
 1280 JSR houses
 1290 JSR trees
 1300 LDY #0
 1310 STY town
 1320 .setpop1
 1330 LDX #0
 1340 .setpop2
 1350 LDA #0
 1360 CPX town
 1370 BEQ gotpop
 1380 LDA maxpas
 1390 JSR randa
 1400 .gotpop
 1410 STA pas,Y
 1420 CLC
 1430 ADC pop
 1440 STA pop
 1450 BCC popnothi
 1460 INC pop+1
 1470 .popnothi
 1480 INY
 1490 INX
 1500 CPX #towns
 1510 BNE setpop2
 1520 TYA:PHA
 1530 LDY town
 1540 JSR platform
 1550 PLA:TAY
 1560 INC town
 1570 LDA town
 1580 CMP #towns
 1590 BNE setpop1
 1600 JSR showpop
 1610 JSR shed
 1620 LDA total+1
 1630 CMP bonusat+1
 1640 BCC nobo
 1650 BNE yesbo
 1660 LDA total
 1670 CMP bonusat
 1680 BCC nobo
 1690 .yesbo
 1700 ASL bonusat
 1710 ROL bonusat+1
 1720 LDA trains
 1730 CMP #stock
 1740 BEQ nobo
 1750 INC trains
 1760 LDY #56
 1770 JSR sound
 1780 JSR shed
 1790 .nobo
 1800 .gameloop
 1810 JSR writes
 1820 EQUB 31:EQUB 18:EQUB 0
 1830 EQUB 17:EQUB 131
 1840 EQUB 17:EQUB 0
 1850 EQUB 254
 1860 LDA hours
 1870 LDX #2
 1880 JSR decimal
 1890 LDA #ASC":"
 1900 JSR oswrch
 1910 LDA minutes
 1920 LDX #2
 1930 JSR decimal
 1940 INC minutes
 1950 LDA minutes
 1960 CMP #60
 1970 BNE nohour
 1980 LDA #0
 1990 STA minutes
 2000 INC hours
 2010 LDA hours
 2020 CMP #24
 2030 BNE nohour
 2040 LDA #0
 2050 STA hours
 2060 .nohour
 2070 JSR writes
 2080 EQUB 17:EQUB 128
 2090 EQUB 254
 2100 LDA #stock-1
 2110 STA train
 2120 .moveloop
```

```
2130 LDX train
2140 LDA status,X
2150 BMI none
2160 BEQ jsrdemon
2170 CMP #1
2180 BEQ jsrnormal
2190 DEC status,X
2200 LDA status,X
2210 CMP #3
2220 BNE none
2230 JSR whistle
2240 .none
2250 DEC train
2260 BPL moveloop
2270 LDA timer
2280 BEQ time0
2290 DEC timer
2300 JMP nonewtrain
2310 .jsrdemon
2320 JSR demon
2330 JMP none
2340 .jsrnormal
2350 JSR normal
2360 JMP none
2370 .time0
2380 LDA inplay
2390 CMP onsheet
2400 BCS nonewtrain
2410 LDA trains
2420 BEQ nonewtrain
2430 JSR newtrain
2440 .nonewtrain
2450 LDX control
2460 LDA status,X
2470 BEQ jsrnt
2480 BPL trainok
2490 .jsrnt
2500 JSR nexttrain
2510 .trainok
2520 LDA playspeed
2530 STA frames
2540 .keyloop
2550 LDA #19
2560 JSR osbyte
2570 LDA #129
2580 LDX #0
2590 LDY #0
2600 JSR osbyte
2610 CPY #&FF
2620 BEQ nokey
2630 TXA
2640 CMP #ASC"a"
2650 BCC notlower
2660 CPX #ASC"z"+1
2670 BCS notlower
2680 SEC
2690 SBC #32
2700 .notlower
2710 STA key
2720 LDY #0
2730 .findkey
2740 LDA keytab,Y
2750 BEQ nokey
2760 CMP key
2770 BEQ gotkey
2780 INY:INY:INY:INY
2790 BNE findkey
2800 .gotkey
2810 LDA key
2820 SEC
2830 SBC keytab+1,Y
2840 PHA
2850 LDA keytab+2,Y
2860 STA keyjsr+1
2870 LDA keytab+3,Y
2880 STA keyjsr+2
2890 PLA
2900 .keyjsr
2910 JSR &ABCD
2920 .nokey
2930 DEC frames
2940 BNE keyloop
2950 LDA trains
2960 BEQ roundend
2970 LDA pop
2980 ORA pop+1
2990 BEQ roundend
3000 LDA hours
3010 BEQ roundend
3020 JMP gameloop
3030 .roundend
3040 JSR replaceall
3050 ]
3060 PROCvdus("InfoVs")
3070 [OPT pass%
3080 LDA trains
3090 BEQ nosafe
3100 LDA hours
3110 BEQ nosafe
3120 CMP eta
3130 BCC usesafe
3140 .nosafe
3150 LDA #0
3160 STA safe
3170 STA safe+1
3180 .usesafe
3190 LDA fares
3200 CLC
3210 ADC safe
3220 STA temp
3230 LDA fares+1
3240 ADC safe+1
3250 PHA
3260 LDA temp
3270 SEC
3280 SBC costs
3290 STA net
3300 PLA
3310 SBC costs+1
3320 STA net+1
3330 PHP
3340 BCC loss
3350 JSR writes
3360 EQUS "profit"
3370 EQUB 17:EQUB 2
3380 EQUB 254
3390 JMP netdone
3400 .loss
3410 JSR writes
3420 EQUS "loss"
3430 EQUB 17:EQUB 1
3440 EQUB 254
3450 LDX #net
3460 JSR abs
3470 .netdone
3480 JSR writes
3490 EQUB 31:EQUB 24:EQUB 16
3500 EQUB 254
3510 LDY #net
3520 JSR zplsdtab
3530 JSR writes
3540 EQUB 31:EQUB 24:EQUB 18
3550 EQUB 17:EQUB 2
3560 EQUB 254
3570 LDY #total
3580 JSR zplsdtab
3590 LDA #0
3600 STA temp
3610 PLP
3620 PHP
3630 BCC subtotal
3640 LDA total
3650 CLC
3660 ADC net
3670 STA total
3680 LDA total+1
3690 ADC net+1
3700 STA total+1
3710 JMP totalpos
3720 .subtotal
3730 LDA total
3740 SEC
3750 SBC net
3760 STA total
3770 LDA total+1
3780 SBC net+1
3790 STA total+1
3800 BCS totalpos
3810 LDX #total
3820 JSR abs
3830 DEC temp
3840 .totalpos
3850 JSR writes
3860 EQUB 31:EQUB 24:EQUB 8
3870 EQUB 17:EQUB 2
3880 EQUB 254
3890 LDY #fares
3900 JSR zplsdtab
3910 JSR writes
3920 EQUB 31:EQUB 24:EQUB 10
3930 EQUB 254
3940 LDY #safe
3950 JSR zplsdtab
3960 JSR writes
3970 EQUB 31:EQUB 24:EQUB 12
3980 EQUB 17:EQUB 1
3990 EQUB 254
4000 LDY #costs
4010 JSR zplsdtab
4020 JSR writes
4030 EQUB 31:EQUB 7:EQUB 22
4040 EQUB 17:EQUB 0
4050 EQUB 254
4060 LDA trains
4070 BEQ endalways
4080 LDA hours
4090 BEQ endalways
4100 PLP
4110 PHP
4120 BCS carried
4130 .endalways
4140 JSR writes
4150 EQUS "Final "
4160 EQUB 254
4170 BIT temp
4180 BPL finaltotal
4190 JSR writes
4200 EQUS "debt"
4210 EQUB 17:EQUB 1
4220 EQUB 254
4230 JMP showtotal
4240 .finaltotal
4250 JSR writes
4260 EQUS "total"
4270 EQUB 17:EQUB 2
4280 EQUB 254
4290 JMP showtotal
4300 .carried
4310 JSR writes
4320 EQUS "Carried over"
4330 EQUB 17:EQUB 2
4340 EQUB 254
4350 .showtotal
4360 JSR writes
4370 EQUB 31:EQUB 24:EQUB 22
4380 EQUB 254
4390 LDY #total
4400 JSR zplsdtab
4410 JSR pstc
4420 INC round
4430 PLP
4440 BCC gameover
4450 LDA trains
4460 BEQ gameover
4470 LDA hours
4480 BEQ gameover
4490 JMP roundloop
4500 .gameover
4510 BIT temp
4520 BPL inblack
4530 .zeroscore
4540 LDA #0
4550 STA total
4560 STA total+1
4570 .inblack
4580 JMP mainloop
4590 :
4600 .abs
4610 LDA #0
4620 SEC
4630 SBC &00,X
4640 STA &00,X
4650 LDA #0
4660 SBC &01,X
4670 STA &01,X
4680 RTS
4690 ]
4700 RETURN
```

Listing 5

```
  10 REM >Part3 - The Train Game '91 (P
o85)
  20 REM By Dave Lawrence
  30 REM For BBC B/B+/M/C/E/A+65Tube
  40 REM (C) BAU October 1991
  50 :
  60 REM New trains, All 'key' routines
, Getting on and off
  70 :
  80 [OPT pass%
  90 .newtrain
 100 LDX #stock
 110 .finddead
 120 DEX
 130 LDA status,X
 140 BPL finddead
 150 STX train
 160 LDA traingap
 170 STA timer
 180 LDA shedx
 190 STA tx,X
 200 PHA
 210 LDA shedy
 220 STA ty,X
 230 TAY
 240 PLA
 250 TAX
 260 JSR peek
 270 LDX train
 280 STA tr,X
 290 LDX #2
 300 JSR exit
 310 LDX train
 320 STA td,X
 330 JSR emptytrain
 340 LDA #20
 350 INC inplay
 360 LDY inplay
 370 CPY trains
 380 BEQ yisstat
 390 BCC yisstat
 400 LDA #0
 410 .yisstat
 420 STA status,X
 430 TXA
 440 CLC
 450 ADC #240
 460 LDX shedx
 470 LDY shedy
 480 JSR poke
 490 LDA train
 500 CMP control
 510 BNE noinfo
 520 JSR info
 530 .noinfo
 540 LDY train
 550 JSR show
 560 JMP shed
 570 :
 580 .emptytrain
 590 LDA #towns-1
 600 STA town
 610 .mtloop
 620 LDX train
 630 LDY town
 640 LDA #0
 650 JSR pokecar
 660 DEC town
 670 BPL mtloop
 680 RTS
 690 :
 700 .stopgo
 710 LDX control
 720 LDA delay
 730 LDY status,X
 740 CPY #1
 750 BEQ aisstat
 760 LDA #1
 770 .aisstat
 780 STA status,X
 790 RTS
 800 :
 810 .reverse
 820 LDA control
 830 .reva
 840 STA revtr
 850 TAX
 860 LDA tr,X
 870 PHA
 880 LDA td,X
 890 TAX
 900 PLA
 910 JSR exit
 920 LDX revtr
 930 STA td,X
 940 LDY revtr
 950 JMP show
 960 :
 970 .timeto0
 980 LDA #0
 990 STA timer
1000 RTS
1010 :
1020 .geton
1030 JSR initloop
1040 BCS nopeople
1050 .onloop
1060 LDX at
1070 LDY to
1080 JSR peekpas
1090 STA wait
1100 BEQ emptyplat
1110 LDX control
1120 LDY to
1130 JSR peekcar
1140 LDX #0
1150 CLC
1160 ADC wait
1170 BCS fartoomany
1180 CMP #99
1190 BCC allgeton
1200 .fartoomany
1210 SBC #99
1220 TAX
1230 LDA #99
1240 .allgeton
1250 JSR aonxleft
1260 .emptyplat
1270 INC to
1280 LDA to
1290 CMP lastto
1300 BEQ onloop
1310 BCC onloop
1320 .update
1330 LDA dflag
1340 BEQ nopeople
1350 LDY at
1360 JSR drawstation
1370 LDY at
1380 JSR platform
1390 JSR info
1400 .nopeople
1410 RTS
1420 :
1430 .onoff
1440 LDA #0
1450 JSR geton
1460 LDA at
1470 CLC
1480 ADC #1
1490 \
1500 .getoff
1510 JSR initloop
1520 BCS nopeople
1530 .offloop
1540 LDX control
1550 LDY to
1560 JSR peekcar
1570 BEQ emptycar
1580 STA wait
1590 LDA to
1600 CMP at
1610 BEQ endofline
1620 LDA costs
1630 CLC
1640 ADC wait
1650 STA costs
1660 BCC notfinal
1670 INC costs+1
1680 BNE notfinal
1690 .endofline
1700 LDA wait
1710 STA temp
1720 CLC
1730 ADC safe
1740 STA safe
1750 BCC payment
1760 INC safe+1
1770 .payment
1780 LDA fares
1790 CLC
1800 ADC #ticket
1810 STA fares
1820 BCC p2
1830 INC fares+1
1840 .p2
1850 DEC temp
1860 BNE payment
1870 LDA pop
1880 SEC
1890 SBC wait
1900 STA pop
1910 LDA pop+1
1920 SBC #0
1930 STA pop+1
```

```
1940 LDA #0
1950 STA wait
1960 JSR reggie
1970 .notfinal
1980 LDX at
1990 LDY to
2000 JSR peekpas
2010 CLC
2020 ADC wait
2030 BCS toomany
2040 TAX
2050 LDA #0
2060 .togetoff
2070 JSR aonxleft
2080 .emptycar
2090 INC to
2100 LDA to
2110 CMP lastto
2120 BEQ offloop
2130 BCC offloop
2140 JSR showpop
2150 JSR showmoney
2160 JMP update
2170 .toomany
2180 CLC
2190 ADC #1
2200 LDX #255
2210 BNE togetoff
2220 :
2230 .initloop
2240 TAX
2250 TAY
2260 DEX
2270 DEY
2280 BPL xtoy
2290 LDX #0
2300 LDY #towns-1
2310 .xtoy
2320 STX to
2330 STY lastto
2340 LDA #0
2350 STA dflag
2360 LDX control
2370 LDA status,X
2380 CMP #2
2390 BCS stopped
2400 SEC
2410 RTS
2420 .stopped
2430 LDY ty,X
2440 LDA tx,X
2450 TAX
2460 \
2470 .xytoat
2480 STY peeky
2490 DEY
2500 JSR peek
2510 SEC
2520 SBC #250
2530 CMP #towns
2540 BCS notat
2550 LDY peeky
2560 INY
2570 JSR peek
2580 SEC
2590 SBC #250
2600 CMP #towns
2610 STA at
2620 .notat
2630 RTS
2640 :
2650 .aonxleft
2660 INC dflag
2670 PHA
2680 TXA
2690 LDX at
2700 LDY to
2710 JSR pokepas
2720 PLA
2730 LDX control
2740 LDY to
2750 JMP pokecar
2760 :
2770 .nexttrain
2780 LDA trains
2790 BEQ allgone
2800 LDX control
2810 JMP notnorm
2820 .findnorm
2830 LDA status,X
2840 BEQ notnorm
2850 BPL gotnorm
2860 .notnorm
2870 INX
2880 CPX control
2890 BEQ gotnorm
2900 CPX #stock
2910 BNE findnorm
2920 LDX #0
2930 BEQ findnorm
2940 .gotnorm
2950 LDY control
2960 STX control
2970 LDA status,Y
2980 BMI noshow
2990 JSR show
3000 .noshow
3010 JSR showcont
3020 JSR info
3030 .allgone
3040 RTS
3050 :
3060 .chpoints
3070 STA ycount
3080 LDX control
3090 LDA tx,X
3100 STA trackx
3110 LDA ty,X
3120 STA tracky
3130 LDA td,X
3140 STA out
3150 .nploop
3160 LDY out
3170 LDA dx,Y
3180 CLC
3190 ADC trackx
3200 STA trackx
3210 TAX
3220 LDA dy,Y
3230 CLC
3240 ADC tracky
3250 STA tracky
3260 TAY
3270 JSR peek
3280 CMP #255
3290 BEQ nochange
3300 TAX
3310 SEC
3320 SBC #240
3330 CMP #stock
3340 BCS nottrain
3350 TAY
3360 LDA tr,Y
3370 TAX
3380 CMP #16
3390 BCC nottrain
3400 LDA status,Y
3410 BNE nochange
3420 TYA:PHA
3430 JSR replace
3440 PLA:TAY
3450 JMP crashexp
3460 .nottrain
3470 TXA
3480 CMP #16
3490 BCC isntpoints
3500 DEC ycount
3510 BNE isntpoints
3520 LSR A
3530 LSR A
3540 LSR A
3550 LSR A
3560 STA new
3570 TXA
3580 ASL A
3590 ASL A
3600 ASL A
3610 ASL A
3620 ORA new
3630 LDX trackx
3640 LDY tracky
3650 JSR pokevdu
3660 LDY #0
3670 JMP sound
3680 .isntpoints
3690 PHA
3700 LDA out
3710 CLC
3720 ADC #4
3730 AND #7
3740 TAX
3750 PLA
3760 JSR exit
3770 STA out
3780 BPL nploop
3790 .nochange
3800 LDY #64
3810 JMP sound
3820 :
3830 .bground
3840 INC bcol
3850 .setbcol
3860 LDY bcol
3870 LDA bcols,Y
3880 BPL newbcol
3890 LDA #0
3900 STA bcol
3910 BEQ setbcol
3920 .newbcol
3930 TAY
3940 LDX #0
3950 JMP vdu19
3960 :
3970 .paused
3980 JSR pstc
3990 JSR labels
4000 JMP showmoney
4010 :
4020 .quitgame
4030 LDA #129
4040 LDX #&FE
4050 LDY #&FF
4060 JSR osbyte
4070 CPX #&FF
4080 BEQ doquit
4090 RTS
4100 .doquit
4110 PLA
4120 PLA
4130 JMP zeroscore
4140 ]
4150 RETURN
```

Listing 6

```
   10 REM >Part4 - The Train Game '91 (P
o86)
   20 REM By Dave Lawrence
   30 REM For BBC B/B+/M/C/E/A+65Tube
   40 REM (C) BAU October 1991
   50 :
   60 REM Normal and demon movement, Cra
shes
   70 :
   80 [OPT pass%
   90 .normal
  100 LDY train
  110 JSR replace
  120 LDX train
  130 LDY td,X
  140 LDA dx,Y
  150 CLC
  160 ADC tx,X
  170 STA tx,X
  180 PHA
  190 LDA dy,Y
  200 CLC
  210 ADC ty,X
  220 STA ty,X
  230 TAY
  240 PLA
  250 TAX
  260 JSR peek
  270 LDX train
  280 STA tr,X
  290 STA new
  300 SEC
  310 SBC #240
  320 CMP #stock
  330 BCS nothitt
  340 TAX
  350 LDA status,X
  360 BEQ nothitt
  370 TXA:PHA:TAY
  380 LDA tr,Y
  390 LDX train
  400 STA tr,X
  410 JSR replace
  420 PLA:TAY
  430 JSR crash
  440 .nothitt
  450 LDX train
  460 LDA td,X
  470 CLC
  480 ADC #4
  490 AND #7
  500 TAX
  510 LDA new
  520 JSR exit
  530 BPL canexitt
  540 LDY train
  550 JMP crashexp
  560 .canexitt
  570 LDX train
  580 STA td,X
  590 LDA tx,X
  600 LDY ty,X
  610 TAX
  620 LDA train
  630 CLC
  640 ADC #240
  650 JSR poke
  660 LDY train
  670 JSR show
  680 RTS
  690 :
  700 .demon
  710 LDY train
  720 JSR replace
  730 LDX train
  740 LDY td,X
  750 LDA dx,Y
  760 CLC
  770 ADC tx,X
  780 STA nx
  790 PHA
  800 LDA dy,Y
  810 CLC
  820 ADC ty,X
  830 STA ny
  840 TAY
  850 PLA
  860 TAX
  870 JSR peek
  880 STA new
  890 CMP #255
  900 BNE notshed
  910 LDA train
  920 JMP reva
  930 .notshed
  940 SEC
  950 SBC #240
  960 CMP #stock
  970 BCS nothitd
  980 TAX
  990 LDA status,X
 1000 BNE hitnorm
 1010 TXA
 1020 JSR reva
 1030 LDA train
 1040 JMP reva
 1050 .hitnorm
 1060 TXA:PHA:TAY
 1070 LDA tr,Y
 1080 STA new
 1090 JSR replace
 1100 PLA:TAY
 1110 JSR crashexp
 1120 .nothitd
 1130 LDX train
 1140 LDA td,X
 1150 CLC
 1160 ADC #4
 1170 AND #7
 1180 TAX
 1190 LDA new
 1200 JSR exit
 1210 BPL canexitd
 1220 LDA new
 1230 LSR A
 1240 LSR A
 1250 LSR A
 1260 LSR A
 1270 STA temp
 1280 LDA new
 1290 ASL A
 1300 ASL A
 1310 ASL A
 1320 ASL A
 1330 ORA temp
 1340 STA new
 1350 LDX nx
 1360 LDY ny
 1370 JSR poke
 1380 JMP nothitd
 1390 .canexitd
 1400 LDX train
 1410 STA td,X
 1420 LDA new
 1430 STA tr,X
 1440 LDA nx
 1450 STA tx,X
 1460 PHA
 1470 LDA ny
 1480 STA ty,X
 1490 TAY
 1500 PLA
 1510 TAX
 1520 LDA train
 1530 CLC
 1540 ADC #240
 1550 JSR poke
 1560 LDY train
 1570 JSR show
 1580 RTS
 1590 :
 1600 .crash
 1610 LDA status,Y
 1620 BEQ wasdemon
 1630 DEC trains
 1640 LDA costs
 1650 CLC
 1660 ADC #traincost MOD 256
 1670 STA costs
 1680 LDA costs+1
 1690 ADC #traincost DIV 256
 1700 STA costs+1
 1710 .wasdemon
 1720 DEC inplay
 1730 LDA #&FF
 1740 STA status,Y
 1750 LDA #0
 1760 STA timer
 1770 LDA #towns-1
 1780 STA dest
 1790 STY crashed+1
 1800 .crashed
 1810 LDX #0
 1820 LDY dest
 1830 JSR peekcar
 1840 STA died
 1850 BEQ nodead
 1860 LDA pop
 1870 SEC
 1880 SBC died
 1890 STA pop
 1900 LDA pop+1
 1910 SBC #0
 1920 STA pop+1
 1930 .compensate
 1940 LDA costs
 1950 CLC
 1960 ADC #compensation
 1970 STA costs
 1980 BCC c2
 1990 INC costs+1
 2000 .c2
 2010 DEC died
 2020 BNE compensate
 2030 .nodead
 2040 DEC dest
 2050 BPL crashed
 2060 JMP showmoney
 2070 :
 2080 .crashexp
 2090 TYA:PHA
 2100 JSR crash
 2110 PLA:TAY
 2120 LDA tx,Y
 2130 JSR mul32
 2140 LDA xtemp
 2150 CLC
 2160 ADC #16
 2170 STA xc
 2180 LDA xtemp+1
 2190 ADC #0
 2200 STA xc+1
 2210 LDA ty,Y
 2220 JSR mul32
 2230 LDA #(1024-16) MOD 256
 2240 SEC
 2250 SBC xtemp
 2260 STA yc
 2270 LDA #(1024-16) DIV 256
 2280 SEC
 2290 SBC xtemp+1
```

```
2300 STA yc+1
2310 LDX #3
2320 .savernd
2330 LDA rd,X
2340 STA fixrd,X
2350 DEX
2360 BPL savernd
2370 LDY #32
2380 JSR sound
2390 LDA #2
2400 STA xcount
2410 .twotimes
2420 LDX #3
2430 .loadrnd
2440 LDA fixrd,X
2450 STA rd,X
2460 DEX
2470 BPL loadrnd
2480 LDA #2
2490 STA ycount
2500 .plotdots
2510 LDA xcount
2520 CMP #1
2530 BEQ nobang
2540 LDA ycount
2550 AND #1
2560 BEQ nobang
2570 LDA #100
2580 SEC
2590 SBC ycount
2600 LDY #40
2610 JSR sounda
2620 .nobang
2630 LDA #4
2640 JSR randa32
2650 STA dotcol
2660 JSR writes
2670 EQUB 18:EQUB 3
2680 .dotcol EQUB 0
2690 EQUB 25:EQUB 69
2700 EQUB 254
2710 LDX #xc
2720 JSR rnddot
2730 LDX #yc
2740 JSR rnddot
2750 INC ycount
2760 LDA ycount
2770 CMP #100
2780 BNE plotdots
2790 DEC xcount
2800 BNE twotimes
2810 LDY #48
2820 JMP sound
2830 :
2840 .rnddot
2850 LDA ycount
2860 STA temp
2870 LSR temp
2880 JSR randa
2890 LDY #0
2900 SEC
2910 SBC temp
2920 BPL notneg
2930 LDY #&FF
2940 .notneg
2950 CLC
2960 ADC &00,X
2970 PHP
2980 JSR oswrch
2990 TYA
3000 PLP
3010 ADC &01,X
3020 JMP oswrch
3030 ]
3040 RETURN
```

Listing 7

```
   10 REM >Part5 - The Train Game '91 (P
o87)
   20 REM By Dave Lawrence
   30 REM For BBC B/B+/M/C/E/A+65Tube
   40 REM (C) BAU October 1991
   50 :
   60 REM Map making and printing
   70 :
   80 [OPT pass%
   90 .makemap
  100 LDA #0
  110 STA setx
  120 STA sety
  130 LDX #boardx-1
  140 LDY #boardy-1
  150 LDA #255
  160 JSR set
  170 LDA #1
  180 STA sety
  190 LDX #boardx-1
  200 LDY #boardy-3
  210 LDA #0
  220 JSR set
  230 JSR stations
  240 LDA #towns-1
  250 STA town
  260 .laytrack
  270 LDY town
  280 LDA townx,Y
  290 SEC
  300 SBC #5
  310 STA setx
  320 LDA towny,Y
  330 CLC
  340 ADC #2
  350 STA sety
  360 LDX #4-1
  370 LDY #1-1
  380 LDA #0
  390 JSR set
  400 LDA setx
  410 CLC
  420 ADC #3
  430 TAX
  440 LDY sety
  450 LDA #6
  460 JSR lay
  470 BCC P%+3
  480 RTS
  490 LDA setx
  500 CLC
  510 ADC #11
  520 STA setx
  530 LDX #4-1
  540 LDY #1-1
  550 LDA #0
  560 JSR set
  570 LDX setx
  580 LDY sety
  590 LDA #2
  600 JSR lay
  610 BCC P%+3
  620 RTS
  630 DEC town
  640 BPL laytrack
  650 LDA shedx
  660 SEC
  670 SBC #3
  680 STA setx
  690 LDA shedy
  700 STA sety
  710 LDX #2
  720 LDY #0
  730 LDA #0
  740 JSR set
  750 LDX shedx
  760 DEX
  770 LDY shedy
  780 LDA #6
  790 JSR lay
  800 BCC P%+3
  810 RTS
  820 LDA extras
  830 BEQ noextras
  840 STA town
  850 .others
  860 JSR rand
  870 AND #31
  880 CLC
  890 ADC #2
  900 TAX
  910 LDA #20
  920 JSR randa32
  930 CLC
  940 ADC #5
  950 TAY
  960 LDA #5
  970 STA xcount
  980 .checkspace
  990 JSR peek
 1000 BNE others
 1010 INX
 1020 DEC xcount
 1030 BNE checkspace
 1040 DEX
 1050 DEX
 1060 DEX
 1070 STX setx
 1080 STY sety
 1090 LDA #8
 1100 JSR pokevdu
 1110 LDA #255
 1120 JSR poke
 1130 DEX
 1140 LDA #6
 1150 JSR lay
 1160 BCC P%+3
 1170 RTS
 1180 LDX setx
 1190 INX
 1200 LDY sety
 1210 LDA #2
 1220 JSR lay
 1230 BCC P%+3
 1240 RTS
 1250 LDX setx
 1260 LDY sety
 1270 LDA #8
 1280 JSR pokevdu
 1290 DEC town
 1300 BNE others
 1310 .noextras
 1320 LDA #towns-1
 1330 STA town
 1340 .stisloop
 1350 LDY town
 1360 LDA townx,Y
 1370 SEC
 1380 SBC #1
 1390 STA setx
 1400 LDA towny,Y
 1410 CLC
 1420 ADC #2
 1430 STA sety
 1440 LDX #7-1
 1450 LDY #0
 1460 LDA #8
 1470 JSR set
 1480 DEC town
 1490 BPL stisloop
 1500 LDX shedx
 1510 LDY shedy
 1520 LDA #8
 1530 JSR pokevdu
 1540 CLC
 1550 RTS
 1560 :
 1570 .lay
 1580 STX trackx
 1590 STY tracky
 1600 STA out
 1610 LDA #0
 1620 STA wrong
 1630 STA wrong+1
 1640 .layloop
 1650 LDA wrong+1
 1660 BEQ wrongok
 1670 SEC
 1680 RTS
 1690 .wrongok
 1700 LDA out
 1710 CLC
 1720 ADC #4
 1730 AND #7
 1740 STA in
 1750 .not3
 1760 JSR rand
 1770 AND #3
 1780 CMP #3
 1790 BEQ not3
 1800 CLC
 1810 ADC #7
 1820 ADC out
 1830 AND #7
 1840 STA out
 1850 LDX in
 1860 LDY out
 1870 JSR piece
 1880 LDX trackx
 1890 LDY tracky
 1900 JSR pokevdu
 1910 LDY out
 1920 LDA dx,Y
 1930 CLC
 1940 ADC trackx
 1950 BEQ dobackup
 1960 CMP #boardx-1
 1970 BCS dobackup
 1980 STA nx
 1990 LDA dy,Y
 2000 CLC
 2010 ADC tracky
 2020 BEQ dobackup
 2030 CMP #boardy-1
 2040 BCS dobackup
 2050 STA ny
 2060 LDX nx
 2070 LDY ny
 2080 JSR peek
 2090 CMP #16
 2100 BCS dobackup
 2110 CMP #0
 2120 BEQ empty
 2130 JSR points
 2140 BMI dobackup
 2150 CLC
 2160 RTS
 2170 :
 2180 .empty
 2190 LDA wrong
 2200 ORA wrong+1
 2210 BEQ notwrong
 2220 LDA wrong
 2230 BNE nothi
 2240 DEC wrong+1
 2250 .nothi
 2260 DEC wrong
 2270 .notwrong
 2280 LDA nx
 2290 STA trackx
 2300 LDA ny
 2310 STA tracky
 2320 JMP layloop
 2330 .dobackup
 2340 JSR backup
 2350 JMP layloop
 2360 :
 2370 .points
 2380 STA new
 2390 LDX #&FF
 2400 .findexits
 2410 INX
 2420 LDA new
 2430 JSR exit
 2440 BMI findexits
 2450 STX xtemp
 2460 JSR checkjoin
 2470 BPL joined
 2480 LDA xtemp
 2490 JSR checkjoin
 2500 BPL joined
 2510 RTS
 2520 .joined
 2530 STA temp
 2540 LDX nx
 2550 LDY ny
 2560 JSR peek
 2570 ASL A
 2580 ASL A
 2590 ASL A
 2600 ASL A
 2610 ORA temp
 2620 JSR pokevdu
 2630 LDA #0
 2640 RTS
 2650 :
 2660 .checkjoin
 2670 TAY
 2680 LDA out
 2690 CLC
 2700 ADC #4
 2710 AND #7
 2720 TAX
 2730 JMP piece
 2740 :
 2750 .backup
 2760 LDA wrong
 2770 CLC
 2780 ADC #2
 2790 STA wrong
 2800 BCC wnh
 2810 INC wrong+1
 2820 .wnh
 2830 LDA wrong+1
 2840 LSR A
 2850 STA goback+1
 2860 LDA wrong
 2870 ROR A
 2880 STA goback
 2890 LDA in
 2900 STA out
 2910 .backloop
 2920 LDX trackx
 2930 LDY tracky
 2940 LDA #0
 2950 JSR pokevdu
 2960 LDY out
 2970 LDA dx,Y
 2980 CLC
 2990 ADC trackx
 3000 STA nx
 3010 TAX
 3020 LDA dy,Y
 3030 CLC
 3040 ADC tracky
 3050 STA ny
 3060 TAY
 3070 JSR peek
 3080 CMP #16
 3090 BCS goneback
 3100 PHA
 3110 LDA out
 3120 CLC
 3130 ADC #4
 3140 AND #7
 3150 TAX
 3160 PLA
 3170 JSR exit
 3180 STA out
 3190 LDA nx
 3200 STA trackx
 3210 LDA ny
 3220 STA tracky
 3230 LDA goback
 3240 BNE gbnh
 3250 DEC goback+1
 3260 .gbnh
 3270 DEC goback
 3280 LDA goback
 3290 ORA goback
 3300 BNE backloop
 3310 .goneback
 3320 LDA out
 3330 CLC
 3340 ADC #4
 3350 AND #7
 3360 STA out
 3370 RTS
 3380 :
 3390 .stations
 3400 LDA #towns-1
 3410 STA town
 3420 .setstats
 3430 LDY town
 3440 JSR drawstation
 3450 JSR writes
 3460 EQUB 10:EQUB 10:EQUB 8:EQUB 8
 3470 EQUS STRING$(7,CHR$(track_char+8-1
))
 3480 EQUB 254
 3490 LDY town
 3500 LDA townx,Y
 3510 STA setx
 3520 LDA towny,Y
 3530 STA sety
 3540 LDX #4
 3550 LDY #3
 3560 LDA town
 3570 CLC
 3580 ADC #250
 3590 JSR set
 3600 LDA setx
 3610 SEC
 3620 SBC #5
 3630 STA setx
 3640 LDA sety
 3650 CLC
 3660 ADC #2
 3670 STA sety
 3680 LDX #14
 3690 LDY #0
 3700 LDA #255
 3710 JSR set
 3720 DEC town
 3730 BPL setstats
 3740 LDX shedx
 3750 INX
 3760 STX sxp
```

```
3770 LDY shedy
3780 DEY
3790 STY syp
3800 JSR writes
3810 EQUB 31
3820 .sxp EQUB 0
3830 .syp EQUB 0
3840 EQUB 17:EQUB 1
3850 EQUB 247:EQUB 247:EQUB 247:EQUB 24
7:EQUB 10
3860 EQUB 8:EQUB 8:EQUB 8:EQUB 8:EQUB 8
3870 EQUB 17:EQUB 3
3880 EQUB 231:EQUB 250:EQUB 250:EQUB 25
0:EQUB 250
3890 EQUB 254
3900 LDA shedx
3910 SEC
3920 SBC #3
3930 STA setx
3940 LDA shedy
3950 SEC
3960 SBC #3
3970 STA sety
3980 LDX #8
3990 LDY #5
4000 LDA #255
4010 JMP set
4020 :
4030 .houses
4040 LDA #towns-1
4050 STA town
4060 .tloop
4070 LDY town
4080 LDA townx,Y
4090 SEC
4100 SBC #3
4110 STA setx
4120 LDA towny,Y
4130 SEC
4140 SBC #2
4150 STA sety
4160 LDA #50
4170 STA temp
4180 .hloop
4190 LDA #10
4200 JSR randa32
4210 CLC
4220 ADC setx
4230 TAX
4240 LDA #8
4250 JSR randa32
4260 CLC
4270 ADC sety
4280 BEQ nohouse
4290 CMP #boardy-2
4300 BCS nohouse
4310 TAY
4320 JSR peek
4330 BNE nohouse
4340 INY
4350 JSR peek
4360 BNE nohouse
4370 LDA #house_char
4380 JSR pokevdu
4390 DEY
4400 LDA #roof_char
4410 JSR pokevdu
4420 .nohouse
4430 DEC temp
4440 BNE hloop
4450 DEC town
4460 BPL tloop
4470 :
4480 .trees
4490 LDA #30
4500 STA temp
4510 .treeloop
4520 LDA #11
4530 JSR randa32
4540 CLC
4550 ADC #25
4560 TAX
4570 LDA #9
4580 JSR randa32
4590 CLC
4600 ADC #17
4610 TAY
4620 JSR peek
4630 BNE notree1
4640 LDA #tree_char
4650 JSR pokevdu
4660 .notree1
4670 LDA #11
4680 JSR randa32
4690 CLC
4700 ADC #5
4710 TAX
4720 LDA #9
4730 JSR randa32
4740 CLC
4750 ADC #5
4760 TAY
4770 JSR peek
4780 BNE notree2
4790 LDA #tree_char
4800 JSR pokevdu
4810 .notree2
4820 DEC temp
4830 BNE treeloop
4840 RTS
4850 :
4860 .checkmap
4870 LDY #(boardx*boardy)/8
4880 LDA #0
4890 .cv1
4900 STA visited-1,Y
4910 DEY
4920 BNE cv1
4930 LDY #towns-1
4940 .cv2
4950 STA visit,Y
4960 DEY
4970 BPL cv2
4980 LDA shedx
4990 STA trackx
5000 LDA shedy
5010 STA tracky
5020 LDA #6
5030 STA out
5040 JSR checkfrom
5050 LDY #towns-1
5060 .cv3
5070 LDA visit,Y
5080 BPL novisit
5090 DEY
5100 BPL cv3
5110 .novisit
5120 RTS
5130 :
5140 .checkfrom
5150 LDX trackx
5160 LDY tracky
5170 JSR peekv
5180 BEQ cf2
5190 RTS
5200 .cf2
5210 LDA out
5220 CLC
5230 ADC #4
5240 AND #7
5250 STA in
5260 JSR pokev
5270 JSR peek
5280 STA new
5290 LDX trackx
5300 LDY tracky
5310 JSR xytoat
5320 BCS inopen
5330 TAX
5340 DEC visit,X
5350 .inopen
5360 LDA new
5370 CMP #16
5380 BCS twoway
5390 LDA new
5400 LDX in
5410 JSR exit
5420 STA out
5430 JSR dxdy
5440 JMP checkfrom
5450 .twoway
5460 LDA trackx:PHA
5470 LDA tracky:PHA
5480 LDA new
5490 LDX in
5500 JSR exit
5510 BPL gotout2
5520 LDA new
5530 LDX in
5540 JSR exithi
5550 STA out2
5560 TAX
5570 LDA new
5580 JSR exit
5590 JMP gotouts
5600 .gotout2
5610 STA out2
5620 LDA new
5630 LDX in
5640 JSR exithi
5650 BPL gotouts
5660 LDA new
5670 LDX out2
5680 JSR exithi
5690 .gotouts
5700 STA out
5710 JSR dxdy
5720 LDA out2:PHA
5730 JSR checkfrom
5740 PLA:STA out
5750 PLA:STA tracky
5760 PLA:STA trackx
5770 LDA out
5780 JSR dxdy
5790 JMP checkfrom
5800 :
5810 .dxdy
5820 TAY
5830 LDA dx,Y
5840 CLC
5850 ADC trackx
5860 STA trackx
5870 LDA dy,Y
5880 CLC
5890 ADC tracky
5900 STA tracky
5910 RTS
5920 ]
5930 RETURN
```

Listing 8

```
10 REM >Part6 - The Train Game '91 (P
o88)
20 REM By Dave Lawrence
30 REM For BBC B/B+/M/C/E/A+65Tube
40 REM (C) BAU October 1991
50 :
60 REM Display routines for Stations,
Shed, Track, Trains & Money
70 :
80 [OPT pass%
90 .drawstation
100 LDA #31
110 JSR oswrch
120 LDA townx,Y
130 JSR oswrch
140 LDA towny,Y
150 JSR oswrch
160 LDX #3
170 JSR setcol
180 TYA
190 CLC
200 ADC #65
210 JSR oswrch
220 JSR moveblhc
230 ]
240 PROCvdus("StatVs")
250 [OPT pass%
260 RTS
270 :
280 .platform
290 JSR moveblhc
300 JSR writes
310 EQUB 5
320 EQUB 18:EQUB 0:EQUB 1
330 EQUB 25:EQUB 0:EQUW 24:EQUW 0
340 EQUB 254
350 LDX multowns,Y
360 LDY #5
370 .ploop
380 LDA pas,X
390 BEQ nobody
400 JSR writes
410 EQUB 245
420 EQUB 25:EQUB 0:EQUW -32:EQUW 0
430 EQUB 254
440 .nobody
450 JSR writes
460 EQUB 25:EQUB 0:EQUW 20:EQUW 0
470 EQUB 254
480 INX
490 DEY
500 BNE ploop
510 LDA #4
520 JMP oswrch
530 :
540 .shed
550 LDA #31
560 JSR oswrch
570 LDA shedx
580 CLC
590 ADC #1
600 JSR oswrch
610 LDA shedy
620 JSR oswrch
630 LDX #2
640 JSR setcol
650 LDX #131
660 JSR setcol
670 LDA trains
680 SEC
690 SBC inplay
700 BMI noshed
710 STA temp
720 LDX #0
730 .shedloop
740 LDA #243
750 CPX temp
760 BCC wrcha
770 LDA #32
780 .wrcha
790 JSR oswrch
800 INX
810 CPX #4
820 BNE shedloop
830 .noshed
840 LDX #128
850 JMP setcol
860 :
870 .showcont
880 LDY control
890 .show
900 JSR tabfory
910 CPY control
920 BNE notcont
930 LDX #131
940 JSR setcol
950 .notcont
960 LDX #2
970 LDA status,Y
980 BNE showt
990 LDX #1
1000 .showt
1010 JSR setcol
1020 LDA td,Y
1030 CLC
1040 ADC #237
1050 JSR oswrch
1060 LDX #128
1070 JMP setcol
1080 :
1090 .replaceall
1100 LDA #stock-1
1110 STA train
1120 .reploop
1130 LDY train
1140 LDA status,Y
1150 BMI notout
1160 JSR replace
1170 .notout
1180 DEC train
1190 BPL reploop
1200 RTS
1210 :
1220 .replace
1230 LDA tr,Y
1240 CMP #240
1250 BCS noreplace
1260 PHA
1270 LDX #129
1280 CMP #16
1290 BCS reppoints
1300 LDX #128
1310 .reppoints
1320 JSR setcol
1330 JSR tabfory
1340 LDX #3
1350 JSR setcol
1360 AND #15
1370 CLC
1380 ADC #track_char-1
1390 JSR oswrch
1400 LDX #128
1410 JSR setcol
1420 LDX tx,Y
1430 LDA ty,Y
1440 TAY
1450 PLA
1460 JSR poke
1470 .noreplace
1480 RTS
1490 :
1500 .labels
1510 JSR writes
1520 EQUB 17:EQUB 3
1530 EQUB 31:EQUB 0:EQUB 31
1540 EQUS "Fares:"
1550 EQUB 31:EQUB 20:EQUB 31
1560 EQUS "Costs:"
1570 EQUB 31:EQUB 17:EQUB 0
1580 EQUB 251
1590 EQUB 17:EQUB 0
1600 EQUB 17:EQUB 131
1610 EQUS "  :  "
1620 EQUB 17:EQUB 3
1630 EQUB 17:EQUB 128
1640 EQUB 252
1650 EQUB 17:EQUB 1
1660 EQUB 31:EQUB 10:EQUB 0
1670 EQUB 245:EQUB 245
1680 EQUB 30
1690 EQUS "Round "
1700 EQUB 17:EQUB 3
1710 EQUB 254
1720 RTS
1730 :
1740 .showpop
1750 JSR writes
1760 EQUB 31:EQUB 17:EQUB 0
1770 EQUB 127:EQUB 127:EQUB 127:EQUB 12
7
1780 EQUB 17:EQUB 3
1790 EQUB 254
1800 LDA pop
1810 STA number
1820 LDA pop+1
1830 STA number+1
1840 LDX #0
1850 JMP decnum
1860 :
1870 .info
1880 JSR writes
1890 EQUB 31:EQUB 25:EQUB 0
1900 EQUB 254
1910 LDA #0
1920 STA town
1930 .infoloop
1940 LDA town
1950 CLC
1960 ADC #65
1970 STA asctown
1980 JSR writes
1990 EQUB 17:EQUB 129
2000 EQUB 17:EQUB 3
2010 .asctown EQUB 0
2020 EQUB 17:EQUB 131
2030 EQUB 17:EQUB 0
2040 EQUB 254
2050 LDX control
2060 LDY town
2070 JSR peekcar
2080 LDX #2
2090 JSR decimal
2100 INC town
2110 LDA town
2120 CMP #towns
2130 BNE infoloop
2140 LDX #128
2150 JMP setcol
2160 :
2170 .showmoney
2180 JSR writes
2190 EQUB 31:EQUB 7:EQUB 31
2200 EQUB 17:EQUB 2
2210 EQUB 254
2220 LDA #fares
2230 JSR dispcash
2240 JSR writes
2250 EQUB 31:EQUB 27:EQUB 31
2260 EQUB 17:EQUB 1
2270 EQUB 254
2280 LDA #costs
2290 \
2300 .dispcash
2310 PHA
```

```
2320 TAY
2330 LDX &00,Y
2340 LDA &01,Y
2350 TAY
2360 JSR lsdcash
2370 LDA #134
2380 JSR osbyte
2390 PLA:TAY
2400 LDA &02,Y
2410 STX &02,Y
2420 SEC
2430 SBC &02,Y
2440 TAY
2450 BEQ noblank
2460 BCC noblank
2470 .blankit
2480 LDA #32
2490 JSR oswrch
2500 DEY
2510 BNE blankit
2520 .noblank
2530 RTS
2540 :
2550 .lsdcash
2560 JSR convlsd
2570 LDA pounds
2580 ORA shillings
2590 ORA pence
2600 BEQ nolsd
2610 LDX pounds
2620 BEQ nopounds
2630 LDA #249
2640 JSR oswrch
2650 TXA
2660 JSR decimalx0
2670 LDA #32
2680 JSR oswrch
2690 .nopounds
2700 LDA shillings
2710 BEQ noshillings
2720 JSR decimalx0
2730 JSR writes
2740 EQUS "s "
2750 EQUB 254
2760 .noshillings
2770 LDA pence
2780 BEQ nopence
2790 JSR decimalx0
2800 LDA #ASC"d"
2810 JSR oswrch
2820 .nopence
2830 RTS
2840 .nolsd
2850 JSR writes
2860 EQUS "None"
2870 EQUB 254
2880 RTS
2890 :
2900 .zplsdtab
2910 LDX &00,Y
2920 LDA &01,Y
2930 TAY
2940 \
2950 .lsdtab
2960 JSR convlsd
2970 LDY #2
2980 .lsdloop
2990 LDA pence,Y
3000 BNE notdash
3010 JSR writes
3020 EQUS "  -"
3030 EQUB 254
3040 JMP dey
3050 .notdash
3060 LDX #128+3
3070 JSR decimal
3080 .dey
3090 DEY
3100 BPL lsdloop
3110 RTS
3120 :
3130 .convlsd
3140 STX lsdno
3150 STY lsdno+1
3160 LDY #0
3170 .lsd1
3180 LDX #16
3190 LDA #0
3200 .lsd2
3210 ASL lsdno
3220 ROL lsdno+1
3230 ROL A
3240 CMP bases,Y
3250 BCC lsd3
3260 SBC bases,Y
3270 INC lsdno
3280 .lsd3
3290 DEX
3300 BNE lsd2
3310 STA pence,Y
3320 INY
3330 LDA lsdno
3340 ORA lsdno+1
3350 BNE lsd1
3360 .lsdpad
3370 CPY #3
3380 BEQ lsd4
3390 LDA #0
3400 STA pence,Y
3410 INY
3420 BNE lsdpad
3430 .lsd4
3440 RTS
3450 .bases EQUB 12:EQUB 20:EQUB 255
3460 ]
3470 RETURN
```

Listing 9

```
   10 REM >Part7 - The Train Game '91 (P
o89)
   20 REM By Dave Lawrence
   30 REM For BBC B/B+/M/C/E/A+65Tube
   40 REM (C) BAU October 1991
   50 :
   60 REM Misc! Decimals, Peek, Poke, Pi
ece, Exit, Rand, Colours, Sound
   70 :
   80 [OPT pass%
   90 .decimalx0
  100 LDX #0
  110 .decimal
  120 STA number
  130 LDA #0
  140 STA number+1
  150 .decnum
  160 TXA
  170 LDX #0
  180 CMP #128
  190 PHP
  200 AND #&7F
  210 STA padit+1
  220 PLP
  230 BCC gpc
  240 LDX #(ASC" " EOR 48)
  250 .gpc
  260 STX padchar+1
  270 TYA:PHA
  280 LDY #0
  290 .dec1
  300 LDX #16
  310 LDA #0
  320 .dec2
  330 ASL number
  340 ROL number+1
  350 ROL A
  360 CMP #10
  370 BCC dec3
  380 SBC #10
  390 INC number
  400 .dec3
  410 DEX
  420 BNE dec2
  430 PHA
  440 INY
  450 LDA number
  460 ORA number+1
  470 BNE dec1
  480 .padit
  490 CPY #0
  500 BCS donepad
  510 .padchar
  520 LDA #0
  530 PHA
  540 INY
  550 BNE padit
  560 .donepad
  570 STY number
  580 .decp
  590 PLA
  600 EOR #48
  610 JSR oswrch
  620 DEC number
  630 BNE decp
  640 PLA:TAY
  650 RTS
  660 :
  670 .writes
  680 CLC
  690 PLA
  700 ADC #1
  710 STA wrp
  720 PLA
  730 ADC #0
  740 STA wrp+1
  750 TYA
  760 PHA
  770 LDY #0
  780 .wrloop
  790 LDA (wrp),Y
  800 INC wrp
  810 BNE wr2
  820 INC wrp+1
  830 .wr2
  840 CMP #254
  850 BEQ writen
  860 JSR oswrch
  870 JMP wrloop
  880 .writen
  890 PLA
  900 TAY
  910 JMP (wrp)
  920 :
  930 .set
  940 STX xtemp
  950 STY ycount
  960 LDY sety
  970 .set1
  980 STX xcount
  990 LDX setx
 1000 .set2
 1010 JSR poke
 1020 INX
 1030 DEC xcount
 1040 BPL set2
 1050 LDX xtemp
 1060 INY
 1070 DEC ycount
 1080 BPL set1
 1090 RTS
 1100 :
 1110 .pokevdu
 1120 PHA
 1130 STX pvx
 1140 STY pvy
 1150 JSR poke
 1160 LDA #129
 1170 LDX #256-99
 1180 LDY #&FF
 1190 JSR osbyte
 1200 CPX #&FF
 1210 BNE nodelay
 1220 LDA #19
 1230 JSR osbyte
 1240 .nodelay
 1250 JSR writes
 1260 EQUB 31
 1270 .pvx EQUB 0
 1280 .pvy EQUB 0
 1290 EQUB 17:EQUB 3
 1300 EQUB 254
 1310 PLA
 1320 PHA
 1330 BNE notblank
 1340 .blank
 1350 LDA #32
 1360 JMP gotchar
 1370 .notblank
 1380 CMP #250
 1390 BCS blank
 1400 CMP #tree_char
 1410 BCC notscenery
 1420 CMP #house_char
 1430 BEQ gotchar
 1440 LDX #1
 1450 CMP #roof_char
 1460 BEQ gotcol
 1470 LDX #2
 1480 .gotcol
 1490 JSR setcol
 1500 JMP gotchar
 1510 .notscenery
 1520 CMP #16
 1530 BCC notpoints
 1540 PHA
 1550 LDX #129
 1560 JSR setcol
 1570 PLA
 1580 AND #15
 1590 .notpoints
 1600 CLC
 1610 ADC #track_char-1
 1620 .gotchar
 1630 JSR oswrch
 1640 LDX #128
 1650 JSR setcol
 1660 LDX pvx
 1670 LDY pvy
 1680 PLA
 1690 RTS
 1700 :
 1710 .poke
 1720 PHA
 1730 CPY #boardy
 1740 BCS pokeoff
 1750 CPX #boardx
 1760 BCS pokeoff
 1770 TXA
 1780 CLC
 1790 ADC mul40lo,Y
 1800 STA pokeaddr+1
 1810 LDA mul40hi,Y
 1820 ADC #0
 1830 STA pokeaddr+2
 1840 PLA
 1850 .pokeaddr
 1860 STA &ABCD
 1870 .pokeoff
 1880 RTS
 1890 :
 1900 .peek
 1910 CPY #boardy
 1920 BCS peekoff
 1930 CPX #boardx
 1940 BCS peekoff
 1950 TXA
 1960 CLC
 1970 ADC mul40lo,Y
 1980 STA peekaddr+1
 1990 LDA mul40hi,Y
 2000 ADC #0
 2010 STA peekaddr+2
 2020 .peekaddr
 2030 LDA &ABCD
 2040 RTS
 2050 .peekoff
 2060 LDA #255
 2070 RTS
 2080 :
 2090 .peekpas
 2100 JSR mulxaddy
 2110 LDA pas,Y
 2120 RTS
 2130 :
 2140 .pokepas
 2150 PHA
 2160 JSR mulxaddy
 2170 PLA
 2180 STA pas,Y
 2190 RTS
 2200 :
 2210 .peekcar
 2220 JSR mulxaddy
 2230 LDA car,Y
 2240 RTS
 2250 :
 2260 .pokecar
 2270 PHA
 2280 JSR mulxaddy
 2290 PLA
 2300 STA car,Y
 2310 RTS
 2320 :
 2330 .mulxaddy
 2340 LDA multowns,X
 2350 STA temp
 2360 TYA
 2370 CLC
 2380 ADC temp
 2390 TAY
 2400 RTS
 2410 :
 2420 .peekv
 2430 STX xtemp
 2440 STY ytemp
 2450 JSR xytobit
 2460 AND visited,Y
 2470 PHP
 2480 LDX xtemp
 2490 LDY ytemp
 2500 PLP
 2510 RTS
 2520 :
 2530 .pokev
 2540 STX xtemp
 2550 STY ytemp
 2560 JSR xytobit
 2570 ORA visited,Y
 2580 STA visited,Y
 2590 .exitv
 2600 LDX xtemp
 2610 LDY ytemp
 2620 RTS
 2630 :
 2640 .xytobit
 2650 STY temp
 2660 TYA
 2670 ASL A
 2680 ASL A
 2690 ADC temp
 2700 STA temp
 2710 TXA
 2720 LSR A
 2730 LSR A
 2740 LSR A
 2750 CLC
 2760 ADC temp
 2770 TAY
 2780 TXA
 2790 AND #7
 2800 TAX
 2810 LDA mask,X
 2820 RTS
 2830 :
 2840 .piece
 2850 STY temp
 2860 CPX temp
 2870 BCC noswap
 2880 TXA
 2890 LDX temp
 2900 TAY
 2910 .noswap
 2920 STX temp
 2930 TYA
 2940 SEC
 2950 SBC temp
 2960 SBC #4
 2970 CMP #&FF
 2980 BEQ pieceok
 2990 CMP #2
 3000 BCC pieceok
 3010 LDA #&FF
 3020 RTS
 3030 .pieceok
 3040 CLC
 3050 ADC temp
 3060 ASL temp
 3070 ADC temp
 3080 ADC #2
 3090 RTS
 3100 :
 3110 .exithi
 3120 LSR A
 3130 LSR A
 3140 LSR A
 3150 LSR A
 3160 .exit
 3170 CMP #240
 3180 BCC realpiece
 3190 LDA #&FF
 3200 RTS
 3210 .realpiece
 3220 STX temp
 3230 AND #15
 3240 SEC
 3250 SBC #1
 3260 ASL A
 3270 ASL A
 3280 ASL A
 3290 ORA temp
 3300 TAY
 3310 LDA exittab,Y
 3320 RTS
 3330 :
 3340 .randa32
 3350 STA maxrand
```

```
3360 .toobig32
3370 JSR rand
3380 AND #31
3390 CMP maxrand
3400 BCS toobig32
3410 RTS
3420 :
3430 .randa
3440 STA maxrand
3450 .toobig
3460 JSR rand
3470 CMP maxrand
3480 BCS toobig
3490 RTS
3500 :
3510 .rand
3520 TXA
3530 PHA
3540 TYA
3550 PHA
3560 LDY #8
3570 .r1
3580 CLC
3590 LDA rd+3
3600 BPL r3
3610 LDX #3
3620 .r2
3630 LDA rd,X
3640 EOR rc,X
3650 STA rd,X
3660 DEX
3670 BPL r2
3680 SEC
3690 .r3
3700 ROL rd
3710 ROL rd+1
3720 ROL rd+2
3730 ROL rd+3
3740 DEY
3750 BPL r1
3760 PLA
3770 TAY
3780 PLA
3790 TAX
3800 LDA rd+3
3810 RTS
3820 :
3830 .moveblhc
3840 LDA #25
3850 JSR oswrch
3860 LDA #4
3870 JSR oswrch
3880 LDA townx,Y
3890 JSR mul32
3900 JSR vdus2
3910 LDA towny,Y
3920 JSR mul32
3930 LDA #(1024-32) MOD 256
3940 SEC
3950 SBC xtemp
3960 STA xtemp
3970 LDA #(1024-32) DIV 256
3980 SEC
3990 SBC xtemp+1
4000 STA xtemp+1
4010 .vdus2
4020 LDA xtemp
4030 JSR oswrch
4040 LDA xtemp+1
4050 JMP oswrch
4060 :
4070 .mul32
4080 STA xtemp
4090 LDA #0
4100 STA xtemp+1
4110 ASL xtemp
4120 ASL xtemp
4130 ASL xtemp
4140 ROL xtemp+1
4150 ASL xtemp
4160 ROL xtemp+1
4170 ASL xtemp
4180 ROL xtemp+1
4190 RTS
4200 :
4210 .setcol
4220 PHA
4230 LDA #17
4240 JSR oswrch
4250 TXA
4260 JSR oswrch
4270 PLA
4280 RTS
4290 :
4300 .vdu19
4310 LDA #19
4320 JSR oswrch
4330 TXA
4340 JSR oswrch
4350 TYA
4360 JSR oswrch
4370 LDA #0
4380 JSR oswrch
4390 JSR oswrch
4400 JMP oswrch
4410 :
4420 .tabfory
4430 PHA
4440 LDA #31
4450 JSR oswrch
4460 LDA tx,Y
4470 JSR oswrch
4480 LDA ty,Y
4490 JSR oswrch
4500 PLA
4510 RTS
4520 :
4530 .cursor
4540 CLC
4550 ADC #95
4560 STA cstate
4570 JSR writes
4580 EQUB 23:EQUB 0:EQUB 10
4590 .cstate EQUB 0
4600 EQUW 0:EQUD 0
4610 EQUB 254
4620 RTS
4630 :
4640 .pstc
4650 JSR writes
4660 EQUB 17:EQUB 128
4670 EQUB 28:EQUB 0:EQUB 31:EQUB 39:EQUB 31
4680 EQUB 12
4690 EQUB 17:EQUB 131
4700 EQUB 31:EQUB 8:EQUB 0
4710 EQUB 17:EQUB 2:EQUS " Press "
4720 EQUB 17:EQUB 1:EQUS "SPACE "
4730 EQUB 17:EQUB 2:EQUS "to continue "
4740 EQUB 17:EQUB 128
4750 EQUB 254
4760 JSR wfs
4770 JSR writes
4780 EQUB 12:EQUB 26
4790 EQUB 254
4800 RTS
4810 :
4820 .wfs
4830 JSR fx15
4840 JSR osrdch
4850 CMP #32
4860 BNE wfs
4870 RTS
4880 :
4890 .fx15
4900 LDA #15
4910 LDX #0
4920 JMP osbyte
4930 :
4940 .reggie
4950 LDA #4
4960 STA regy
4970 .doreg
4980 LDA #13
4990 SEC
5000 SBC regy
5010 ASL A
5020 ASL A
5030 ASL A
5040 TAY
5050 JSR sound
5060 DEC regy
5070 BPL doreg
5080 RTS
5090 :
5100 .whistle
5110 LDY #8
5120 JSR sound
5130 LDY #16
5140 JSR sound
5150 LDY #24
5160 \
5170 .sound
5180 LDA #0
5190 .sounda
5200 PHA
5210 LDX #0
5220 .copysound
5230 LDA sounds,Y
5240 STA sblk,X
5250 INY
5260 INX
5270 CPX #8
5280 BNE copysound
5290 PLA
5300 BEQ nopitch
5310 STA sblk+4
5320 .nopitch
5330 LDX #sblk MOD 256
5340 LDY #sblk DIV 256
5350 LDA #7
5360 JMP osword
5370 ]
5380 RETURN
```

Listing 10

```
10 REM >Part8 - The Train Game '91 (Po810)
20 REM By Dave Lawrence
30 REM For BBC B/B+/M/C/E/A+65Tube
40 REM (C) BAU October 1991
50 :
60 REM Data, Tables
70 :
80 [OPT pass%
90 .keytab
100 EQUS " " : EQUS " " : EQUW nexttrain
110 EQUS "1" : EQUS "0" : EQUW chpoints
120 EQUS "2" : EQUS "0" : EQUW chpoints
130 EQUS "3" : EQUS "0" : EQUW chpoints
140 EQUS "R" : EQUB 0   : EQUW reverse
150 EQUS "S" : EQUB 0   : EQUW stopgo
160 EQUS "T" : EQUB 0   : EQUW timeto0
170 EQUB 9   : EQUB 0   : EQUW onoff
180 EQUB 140 : EQUB 140 : EQUW geton
190 EQUB 141 : EQUB 140 : EQUW geton
200 EQUB 142 : EQUB 140 : EQUW geton
210 EQUB 143 : EQUB 140 : EQUW geton
220 EQUB 144 : EQUB 140 : EQUW geton
230 EQUB 145 : EQUB 140 : EQUW geton
240 EQUB 150 : EQUB 150 : EQUW getoff
250 EQUB 151 : EQUB 150 : EQUW getoff
260 EQUB 152 : EQUB 150 : EQUW getoff
270 EQUB 153 : EQUB 150 : EQUW getoff
280 EQUB 154 : EQUB 150 : EQUW getoff
290 EQUB 155 : EQUB 150 : EQUW getoff
300 EQUS "B" : EQUB 0   : EQUW bground
310 EQUS "P" : EQUB 0   : EQUW paused
320 EQUB 27  : EQUB 0   : EQUW quitgame
330 EQUB 0
340 :
350 .escnames
360 EQUS "Lester Skwaire  "
370 EQUS "Hugh Stonn      "
380 EQUS "Walter Leweast  "
390 EQUS "Ken Tyshtown    "
400 :
410 .dx
420 EQUB  0:EQUB  1:EQUB 1:EQUB 1:EQUB 0:EQUB -1:EQUB -1:EQUB -1
430 .dy
440 EQUB -1:EQUB -1:EQUB 0:EQUB 1:EQUB 1:EQUB  1:EQUB  0:EQUB -1
450 :
460 .rc EQUD &768553
470 :
480 .mask
490 EQUB 128:EQUB 64:EQUB 32:EQUB 16:EQUB 8:EQUB 4:EQUB 2:EQUB 1
500 :
510 .sblk
520 EQUW 0:EQUW 0:EQUW 0:EQUW 0
530 :
540 .sounds
550 \ points
560 EQUW &10:EQUW -12:EQUW   6:EQUW 1
570 \ whistle
580 EQUW &11:EQUW -12:EQUW 120:EQUW 2
590 EQUW &01:EQUW   0:EQUW   0:EQUW 2
600 EQUW &01:EQUW -12:EQUW 120:EQUW 4
610 \ crash
620 EQUW &10:EQUW -12:EQUW   7:EQUW 255
630 EQUW &11:EQUW   0:EQUW   0:EQUW 1
640 EQUW &10:EQUW   0:EQUW   0:EQUW 0
650 \ bonus train
660 EQUW &11:EQUW   1:EQUW 192:EQUW 1
670 \ warning bong
680 EQUW &11:EQUW   1:EQUW  41:EQUW 1
690 \ register!
700 EQUW &10:EQUW -12:EQUW   6:EQUW 1
710 EQUW &11:EQUW   0:EQUW   0:EQUW 2
720 EQUW   0:EQUW   0:EQUW   0:EQUW 1
730 EQUW   0:EQUW -12:EQUW   5:EQUW 2
740 EQUW   1:EQUW   1:EQUW 200:EQUW 2
750 :
760 .bcols
770 EQUB 0:EQUB 2:EQUB 3:EQUB 5:EQUB 6
780 EQUB -1
790 ]
800 board=FNdef(boardx*boardy)
810 visited=FNdef(boardx*boardy/8)
820 tx=FNdef(stock)
830 ty=FNdef(stock)
840 td=FNdef(stock)
850 tr=FNdef(stock)
860 status=FNdef(stock)
870 car=FNdef(stock*towns)
880 pas=FNdef(towns*towns)
890 multowns=FNdef(towns)
900 townx=FNdef(towns)
910 towny=FNdef(towns)
920 shedx=FNdef(1)
930 shedy=FNdef(1)
940 mul40lo=FNdef(boardy)
950 mul40hi=FNdef(boardy)
960 hinames=FNdef((names+1)*16)
970 hiscores=FNdef((names+1)*2)
980 exittab=FNdef(13*8)
990 RETURN
```

Listing 11

```
10 REM >HexLife1 (Po811)
20 REM By Malcolm Banthorpe
30 REM For BBC B/B+/M/C/E/A
40 REM (C) BAU October 1991
50 REM From January 1984
60 :
70 MODE 1
80 VDU 23;8202;0;0;0;
90 VDU 19,1,3;0;
100 VDU 19,2,5;0;
110 VDU 19,3,6;0;
120 sx=64:sy=900
130 dx=108:dy=900
140 VDU 29,sx;sy;
150 PROCdesign
160 size=12
170 colour=2
180 row=1
190 REPEAT
200 size=size+8
210 colour=(colour+1)MOD3
220 PROCmain(sx,sy,dx,dy)
230 sx=dx:sy=dy
240 dx=dx+2*size+20
250 IF dx+2*size>1270 dx=size+20:dy=dy-2*size-72:row=row+1
260 UNTIL row=4
270 END
280 :
290 DEF PROCmain(sx,sy,dx,dy)
300 VDU 29,sx;sy;
310 FOR px=-size TO size STEP 4
320 FOR py=-size TO size STEP 4
330 count=0
340 FOR x=px-8 TO px+8 STEP 16
350 FOR y=py-4 TO py+4 STEP 8
360 IF POINT(x,y)>0 count=count+1
370 NEXT
380 NEXT
390 FOR y=py-8 TO py+8 STEP 16
400 IF POINT(px,y)>0 count=count+1
410 NEXT
420 thiscell=POINT(px,py)
430 IF thiscell>0 AND thiscell<>colour+1 PROCplot(thiscell)
440 IF thiscell=0 AND (count MOD 2)=1 PROCplot(colour+1)
450 NEXT
460 NEXT
470 ENDPROC
480 :
490 DEF PROCplot(col)
500 GCOL 0,col
510 VDU 29,dx;dy;
520 PLOT 69,px,py
530 VDU 29,sx;sy;
540 ENDPROC
550 :
560 DEF PROCdesign
570 MOVE -4,-4:PLOT 0,8,0:PLOT 81,-8,8:PLOT 81,8,0
580 ENDPROC
590 REMDEF PROCdesign
600 MOVE -4,0:PLOT 1,8,0:PLOT 1,-4,4:PLOT 1,0,-8
610 ENDPROC
620 REMDEF PROCdesign
630 MOVE -4,-4:PLOT 1,8,8:PLOT 0,-8,0:PLOT 1,8,-8
640 ENDPROC
```

Listing 12

```
10 REM >HexLife2 (Po812)
20 REM By Malcolm Banthorpe
30 REM For BBC B/B+/M/C/E/A
40 REM (C) BAU October 1991
50 REM From January 1984
60 :
70 MODE 1
80 VDU 23;8202;0;0;0;
90 VDU 29,640;512;
100 VDU 19,1,3;0;
110 VDU 19,2,5;0;
120 VDU 19,3,6;0;
130 size=64
140 gen=0
150 colour=0
160 PROCdesign
170 REPEAT
180 gen=gen+1
190 VDU 30
200 PRINT"Generation ";gen
210 colour=(colour+1)MOD3
220 PROCmain
230 size=size+32
240 UNTIL FALSE
250 END
260 :
270 DEF PROCmain
280 FOR px=-size TO size STEP 16
290 FOR py=-size TO size STEP 16
300 count=0
310 FOR x=px-32 TO px+32 STEP 64
320 FOR y=py-16 TO py+16 STEP 32
330 P%=POINT(x,y)
340 IF P%<>colour+1 AND P%>0 count=count+1
350 NEXT
360 NEXT
370 FOR y=py-32 TO py+32 STEP 64
380 P%=POINT(px,y)
390 IF P%<>colour+1 AND P%>0 count=count+1
400 NEXT
410 thiscell=POINT(px,py)
420 IF thiscell=colour+1 PROCblock(px,py,0)
430 IF count MOD 2=1 AND thiscell=0 PROCblock(px,py,colour+1)
440 NEXT
450 NEXT
460 ENDPROC
470 :
480 DEF PROCdesign
490 FOR px=-16 TO 16 STEP 16
500 FOR py=-16 TO 16 STEP 16
510 PROCblock(px,py,3)
520 NEXT
530 NEXT
540 ENDPROC
550 :
560 DEF PROCblock(bx,by,col)
570 GCOL 0,col
580 MOVE bx-4,by-4:PLOT 0,8,0
590 PLOT 81,-8,8:PLOT 81,8,0
600 ENDPROC
```

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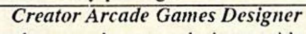
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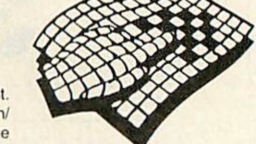
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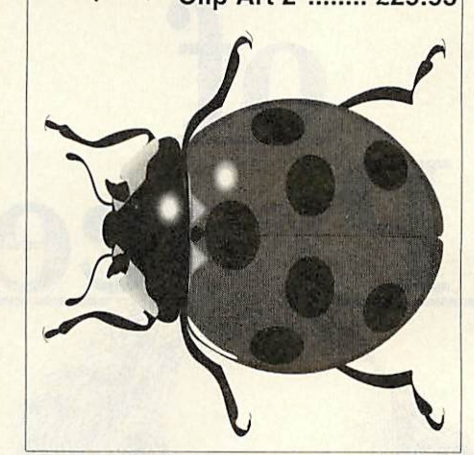
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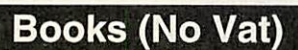
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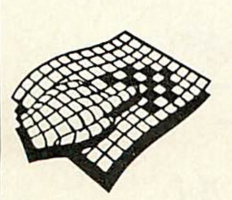
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The New Generation of Word Processors

Word processing is evolving from the traditional character based word processors of the past to the new graphical based word processors. Even on PCs this evolution is evident with the release of new graphic based word processing products that run under Windows 3 from the largest software houses Microsoft, Wordstar and Lotus.

The new generation of word processors all have certain features in common. They all allow free use of different text sizes and styles. They all offer a range of graphic manipulating tools and, of course, they all operate under a windowing environment.

While most PC users are only just coming to grips with the new style of word processing, Archimedes owners have been able to word process like this for 18 months, since the introduction of Impression.

This image (an old engraving of Charles Dickens) was captured using Scan-Light Junior at 400 dpi. This scanner is ideal for black and white line-art or pictures such as this.

Archimedes owners had the use of features like a good WIMP environment and outline fonts long before the PC world caught on. And today the machine still offers features such as inter-application data transfer and font anti-aliasing that no other mainstream system can provide, ensuring that the Archimedes architecture will continue to lead the way. Quite simply you get tomorrow's PC architecture today on the Archimedes.

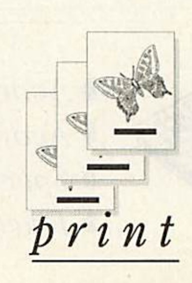
With the release of the new greyscale scanner, Computer Concepts can now supply all the components for Archimedes owners to put together the ultimate word processing system. Our hardware and software products support all three stages of document production, from capturing pictures, through word processing and document creation to printing.



capture



create



print

capture

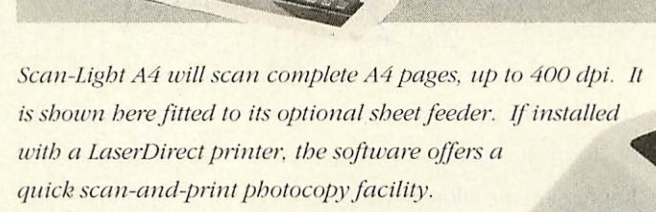
While the Archimedes is powerful enough and flexible enough to handle graphics with supreme ease, this is only useful if it is equally easy to input graphics. The Scan-Light family of image scanners offers a range of capabilities and prices to suit any requirement.

There are three members of the Scan-Light family of image scanners. They are supplied with interface board and simple to use software. (Versions are available to fit internally in the A3000). And thanks to direct data exchange, once a picture has been scanned, it can be dropped directly into an Impression document (or other applications) without having to bother with filenames or having to save, then re-load as would be necessary in other systems.

The Scan-Light software includes many unique features such as instant rotation of the scanned image to any angle, image sampling to produce true grey-level images from black and white scanners, full grey-map control to alter contrast brightness etc. Over the last 18 months the Scan-Light series has become the most popular available with all types of users - home users, professional, and educational.



This image was captured from a print using the new greyscale Scan-Light Junior 256. This is able to capture, display and reproduce stunning quality half-tone photographs, although it can also scan black and white images at up to 400 dpi.



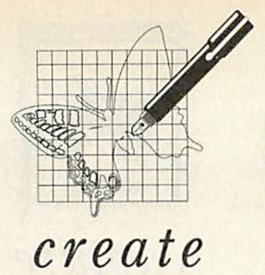
Scan-Light A4 will scan complete A4 pages, up to 400 dpi. It is shown here fitted to its optional sheet feeder. If installed with a LaserDirect printer, the software offers a quick scan-and-print photocopy facility.

Scan-Light A4 £399 +VAT (£468.82 inc)
With sheet feeder £499 +VAT (£586.32 inc)

Scan-Light Junior and Junior 256 are hand-held devices capable of capturing images up to 105mm wide (4.1inches).

Scan-Light Junior mono.. £189+VAT (£220.07 inc)
Scan-Light Junior 256 . . . £220+VAT (£258.50 inc)

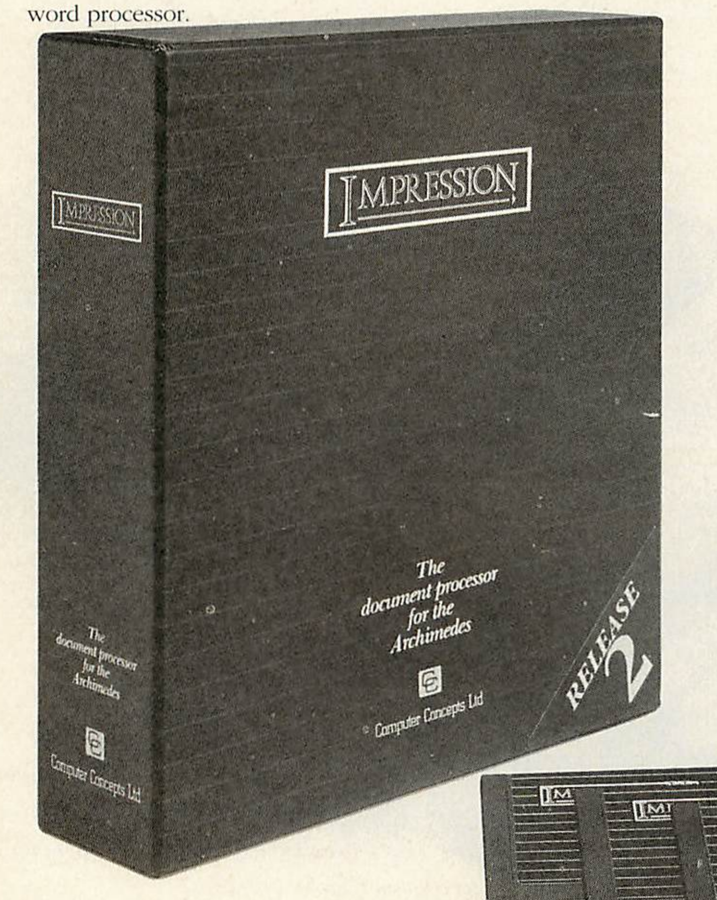
IMPRESSION II



create

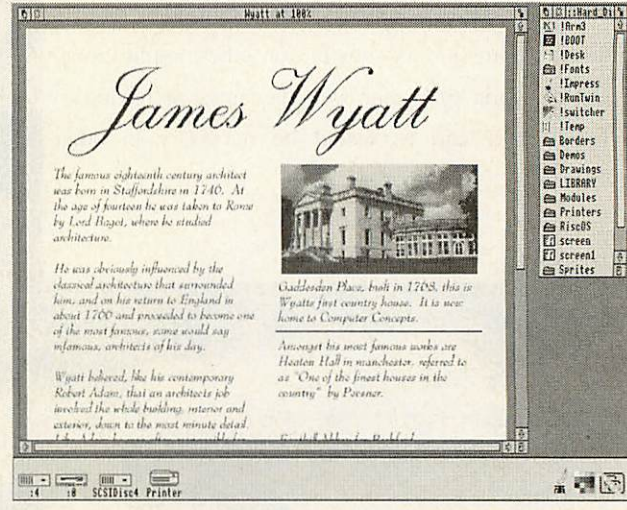


The key part of any system is the word processor. With over 10,000 users (not including the hundreds of educational site-licences installed) Impression Junior and Impression II have become an industry standard for the Archimedes, and it is still growing in popularity. It is probably no co-incidence that the new word processors for other machines are adopting many Impression-like features since it is only logical that, as machines become more powerful, they begin to integrate desk-top-publishing facilities with traditional word processing. Impression is simply the most efficient, compact, fastest product in its class, able to handle the simplest word processing jobs as well as the most complex desk-top-publishing work. It is the only word processor designed to print using either the native character mode of the printer (ideal for text only word processing and dot matrix printers) or using the RISC OS printer drivers for top quality, full page graphics and text. Imagine the freedom of near typeset quality type - any face, any size, any position on the page, with the ability to place diagrams or pictures wherever desired. Impression offers that freedom - perhaps the ultimate evolution of the word processor.



Impression Junior offers all the key Impression features. Built-in SpellMaster spelling checker, full word processing and DTP abilities, outline fancy font and character font editing, full RISC OS compatibility drives RISC OS printer drivers. It is a small compact program ideally suited for the smaller machine.

Impression Junior £89.95+VAT (£105.69 inc)



What you see on screen is always an exact representation of the final printed page, including fonts, columns and graphics.

$$J_n(x) = \frac{x^n}{2^n n!} \sum_{s=0}^{\infty} \frac{1}{s!(n+1)^s} \left(-\frac{1}{4}x^2\right)^s$$

If your word processing requirements include any equations or formulae then our Equasor product integrates with Impression to allow equations to be built up graphically, then just dropped into the Impression document where required.

Impression II is able to handle longer or more complex documents. Enhanced DTP abilities such as instant graphic rotation to any angle, Drawfile frame borders, and guide frames. It also offers unique features for long word processed documents such as contents and index generation, unlimited document length (not RAM limited), styles, in-line graphics etc.

Impression II £169+VAT (£198.57 inc)

print

Once the pictures and text have been processed and arranged as required, you need to be able to print them to the highest possible quality in the shortest possible time. Laser printers provide the quality but have traditionally been slow and expensive. The LaserDirect range of printers offers not only the highest quality printing available (to 600 dpi) but also offers by far the fastest printing available on the Archimedes and at a lower cost than traditional lasers.



LaserDirect Qume. 6 pages per minute 300 dpi. (2Mbyte machine required.)

LaserDirect Qume £999+VAT (£1173.82 inc. Postage extra)

Direct drive laser printers are not a new idea. Apple Mac users have been able to buy direct drive printers for their computers for some time, but while these printers are low cost, they have the reputation of being slow. Here again Archimedes owners win because their machines have the necessary processing power to eliminate the speed problem, and the operating system facilities (such as outline fonts) to ensure that what you see on screen is really exactly what you will get on the printed page. LaserDirect printers offer print speeds of 5 to 10 times that of a typical LaserJet, at a lower cost and can also offer 600 dpi printing for a third of the cost of such printers for other machines. Indeed, so significant have been the benefits, direct drive lasers have now all but eliminated traditional laser printers from the Archimedes market, with the LaserDirect range being the most popular laser printers with Archimedes owners.

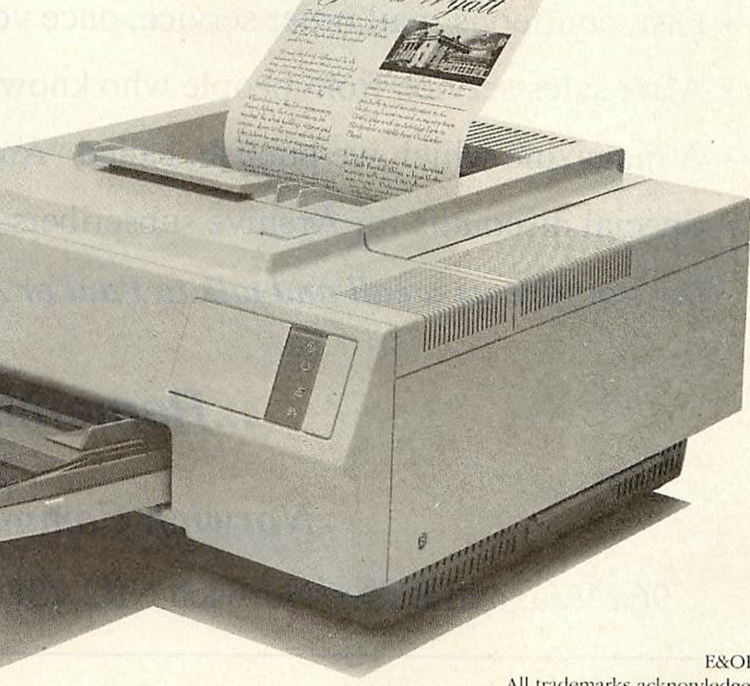
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LaserDirect HiRes8 £1495+VAT (£1756.62 inc. Postage extra)



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RISING STAR

Hypermedia is penetrating more and more areas of industry. **IAN LYNCH** looks at how Avanti, designed by Westland as a helicopter trainer, is breaking out of the defence realm

There has been much improvement in the software support for multi-media applications in recent times and the increased power of computers is enabling better presentation of information in the form of moving pictures and digital audio.

The benefits of continued improvements in computing power are exemplified by *Avanti*, a new software environment developed by Westland Systems Assessment for writing training software. The Westland Group is best known for engineering, particularly in connection with helicopters and defence. It is the complex nature of training staff employed by Westland's customers which makes computer based training necessary.

Avanti generates the courseware applications for student use from a Risc Os-compliant editor. This allows the course author to design quickly courses that involve high-quality sound and graphics animations in addition to words and still pictures.

Like most Archimedes software, *Avanti* can deal directly with *Sprite* and *Draw* formats, but it also supports *Euclid* films, and sound sample modules. There is support for a variety of input devices such as trackerball and touchscreens, so that courses can involve the best user interface for the task. For full screen motion video, there are a library of routines supporting Philips and Sony analogue players and CD-Rom can be accessed via the CD-ROMFS.

Avanti provides an easy memory management set up so that a Ram disc can be used to speed up access to program libraries, fonts and graphics but there is obviously a memory overhead here. *Avanti* will run on a 1Mb machine, but its functionality will be considerably limited. A hard disc is also necessary if courses of any length are to be designed.

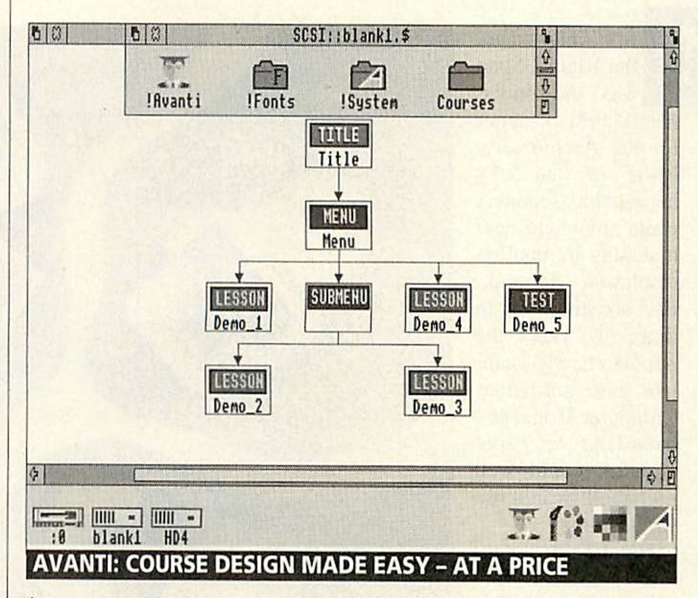
The courseware applications which *Avanti* generates are not Risc OS-compliant and are deliberately designed to shut the student out of the desktop. There are several reasons for this. Firstly, there is no reason why a student on a course on optic fibres should be running other programs. Secondly, the *Avanti* courseware interface is much simpler than Risc OS because it does not have as many different jobs to do. This makes learning to operate the software much quicker.

Thirdly, there is no guarantee that a student will use Risc OS for any other tasks and so learning a more detailed interface is an unnecessary overhead. Given the intended use, this seems to have been a reasonable decision and demonstrates that certain rules and standards need to be viewed flexibly.

The courseware applications are generated as Basic 5 programs and can be edited and extra procedures added. This provides great flexibility including the ability to customise applications to incorporate real-time simulations.

Anyone who has used *Genesis 2* may think that *Avanti* and *Genesis* have a lot in common and they would be right. Both applications broadly handle the same data types and provide for similar hardware expansion and both have a very close relationship with Basic. While *Genesis 2* is a more generalised tool for information organisation, *Avanti* is specifically designed to deliver multi-media courseware in a reasonably standardised format. *Avanti* has comprehensive built-in support for scoring student answers to questions and although *Genesis* does allow this to be done a good deal of script editing would be required in order to make it work comprehensively. One further major difference between the two systems is price. *Genesis 2* is priced at well under £200 and intended for large volume sales. *Avanti* is £2150 and intended for a more specialised low-volume market.

The pricing and power of *Avanti* is interesting from the point of view of someone involved in state education. When I am not writing articles for *BAU*, I am involved with curriculum development work in City Technology Colleges which place great emphasis on the use of IT in learning. Industrial training consumers can easily justify the cost of an Archimedes A540 and *Avanti*, particularly if it results in increased safety and a reduction in staffing costs.



AVANTI: COURSE DESIGN MADE EASY – AT A PRICE

In the engineering and defence industries which are highly technical, comprehensive visualisation and simulation of systems before use can not only save money but can also prevent accidents. In education, budgets for investing in capital equipment are more restrictive and there are probably few schools with large numbers of machines capable of this type of sophisticated delivery.

Nevertheless, some aspects of science and technology teaching would be greatly enhanced by such facilities as would initial teacher training and technology updating courses. Software training courses have the great advantage of being easily up-dated without expensive reprints and if we want to keep teachers up to date in their subjects, computer based distance learning may well prove the only realistic way to do it. Revision of budgeting and accounting procedures lags well behind technological change, but it seems likely that the technology is rapidly reaching a point in its development where it will force some very radical changes in the way education is managed.

SCANNED GOODS

A scanner has become the indispensible accompaniment to any DTP system. **Graham Bell** looks at four of the contenders

Two years ago, the Irlam I-Scan was the undisputed best scanner for the Archimedes. None of the tiny hand-held scanners came anywhere near matching its quality, resolution or tank-like construction. In those two years, the popular handy scanners have got better: Computer Concepts' hand-held, on paper at least, could well give the I-Scan a run for its money.

Hand-held scanners come in only one shape – the familiar hammerhead design. But don't be fooled into thinking them all alike. Inside each case are a number of components, the most important of which is a CCD, or charge-coupled device, sensing strip. The density of the sensors along this strip determines the primary resolution of the scanner – it could be 200 dots per inch, or perhaps even 400. Each sensor can be either straight on/off – which gives a monochrome scanner – or can discriminate 16 or even 256 different shades of grey for each point.

But this simple picture is confused in two ways. First, many monochrome scanners can trade off resolution for 'greys': they have hardware dithering. Just as you can create the illusion of orange by mixing red and yellow dots, the scanners can synthesise apparent grey shades from black and white. Typically, a 400 dots per inch mono scanner can create 16 dithered grey shades at 100 dpi – the dots are still at a density of 400 to the inch, but they are formed into 4x4 groups of mixed black and white dots to make the greys.

Second, any image can be processed after scanning to change the balance between greys and resolution again. So a group of, say, 16 dots, five black and 11 white, become one real grey pixel at a quarter of the resolution.

CLOCKWISE FROM TOP LEFT: TECHNOSCAN II; I-SCAN; SCAN-LIGHT; SCAVENGER

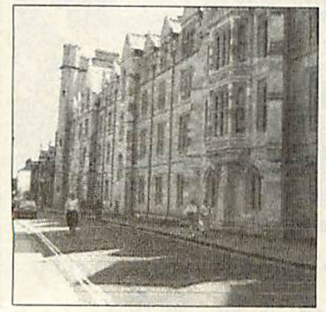
Three of the scanners reviewed are plain 400dpi mono devices with hardware dithering and software that can create greys. But the other two, CC's Scan-Light 256 and the Irlam I-Scan, are genuine grey-scale scanners.

SCAN-LIGHT JUNIOR

Computer Concepts has a range of scanners available, ranging from motorised A4-width machines to the tiny A5 hand scanners. They all, however, connect to some almost identical podules and use the same software.

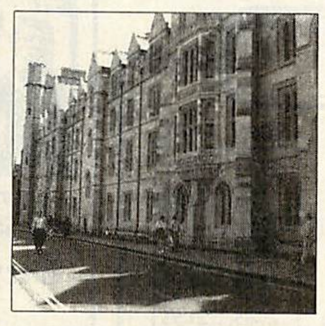
Fitting the podule is simple enough, and the Scan-Light Plus software can be run from either floppy or hard disc in the usual way.

There's an menu from which you have to select which scanner you've connected up. There isn't any way to set this once and for all, and several driver modules are loaded to cater for the various scanner models Scan-Light supports. Editing the Run file



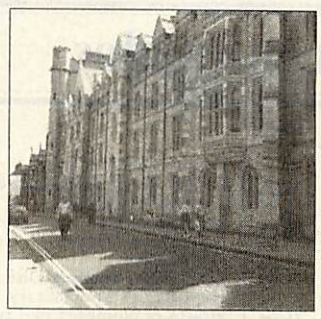


Scan-light (400dpi)



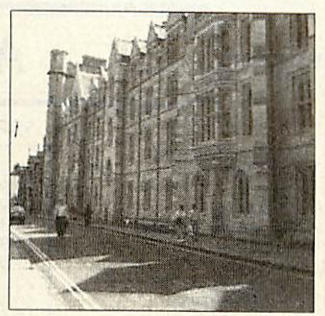


I-Scan (200dpi)





Scavenger (400dpi)





TechnoSCAN II (400dpi)

so that only the relevant drivers load works, but you should be able to save your menu preference.

Using the menus and buttons provided, you can set up the software for the scan you require. You can choose from a plain monochrome scan at 100, 200, 300 or 400 dots per inch resolution, or dithered effects to give 16 'greys'. Then you put the scanner on the image, press the button and draw it down the image slowly and smoothly. A preview window on screen builds up an impression of the image as you scan, but this is next to useless.

A tiny LED on the scanner flashes when you scan too fast, though if it doesn't flash, there may still be streaks across the scan where you've jerked the scanner. Overall, Scan-Light is pretty easy to use, though the scanner has a tendency to twist a little as you draw it down the image – pressing down on the wide bit of the head helps.

The 400dpi monochrome mode works well for line art – scanned diagrams, maps and so on. In fact all the scanners do this well. There's a brightness thumbwheel which can be adjusted to make sure all the white is white, and it's easy to adjust. In the dithered modes, there are three dithering patterns to choose from, and a fair amount of fiddling with the brightness and pattern switches is vital before you get the best scan possible.

But the Scan-Light Plus software shines in processing the dithered scans into real 16-grey sprites. First the original can be cropped, reflected or rotated, then an altered image window opened. A toolbox dialogue allows you to change the number of greys in the final sprite, and to increase or decrease the contrast.

It is remarkably flexible, and you can experiment with the tools as the original scan isn't changed at all. When you're happy with the result, it can be saved as a sprite or as a drawing – sprites have no real 'scale', but *Draw* files do have size information, so this could be a useful option.

SCAN-LIGHT 256

The latest scanner from Computer Concepts shares the podule and software of the main Scan-Light Junior. But while the latter is a 400dpi mono scanner with hardware dithering, a new scanner head allows true grey-scale scanning at 16 or 256 grey levels and up to 400dpi.

Setting up and scanning is exactly the same as for Scan-Light Junior, though you have to be much more careful in scanning: the 'too fast' LED flashes at the slightest jerk in 400dpi, 256 grey mode. I found it almost impossible to obtain a smooth scan at this resolution, but dropping down to 200dpi or 16 greys made it much easier.

More practice would probably help, but you need really steady hands. Another limitation is that only half the width of the scanner is available in the top 400dpi, 256 grey mode – even large postage stamps are okay, but your holiday photos are too big. The full 105mm width works at any resolution with 16 greys, or at 200dpi with 256 greys.

The Archimedes is not capable of displaying 256-grey sprites correctly, and the printer drivers can only resolve 64 shades. The sprites cannot be displayed or edited within *Paint*. But assuming they are going directly into a DTP document or something similar, and being typeset on Postscript equipment, the results speak for themselves.

SCAVENGER

Beebug's scanner has changed the least in the time since it was last reviewed. It is a 200, 300 or 400dpi monochrome scanner with hardware dithering, and with only basic image processing software.

Setting Scavenger up is a five-minute job: just fit the podule. All the software is on the podule's Rom. But neither the scanner itself nor the software quite matched the manual – careful reading of the release note was necessary to discover that there is no 100dpi mode for example. 100dpi mono scans are useful as they occupy the least memory.

Scanning is again simple, and the scanner supplied was marginally easier to use than the others in the test. Two rubber rollers, rather than one, cured the tendency to twist out of line, and the scan button being on the top rather than the side helped too. As scanning proceeds, a preview of the scan appears in a window.

As on all the mono scanners, there's a four-position switch to give pure monochrome scans for text and line images or three dithering patterns, plus a brightness thumbwheel. On the unit reviewed, the LEDs were not bright enough and the wheel had to be turned to its extreme position for normal images – dark originals could not be scanned successfully, and the contrast range was a bit reduced.

Once you've scanned your image, the Scavenger software offers little help – it is deliberately simple so it will fit in the

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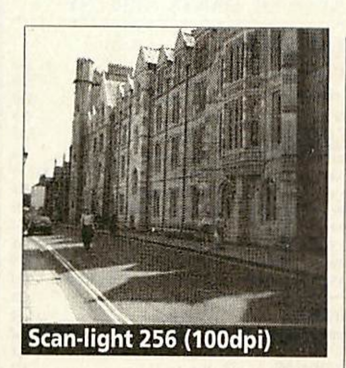
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Scan-light 256 (100dpi)

podule Rom. Only basic reflection and an antialias function are available – for anything more complicated, export the sprite to *Paint*.

This is necessary even to print the sprite though in an Arc with 2Mb or more of Ram having Scavenger and *Paint* running together is a neat solution. Antialias is really a 4x4 pixel averaging function, turning the dithered patterns into 16 real greys at a reduced resolution – like Scan-Light but without the flexibility of choosing the averaging area or the degree of resolution lost.

One unique feature of the software though is that you can store several scans at once, and save the lot in a single sprite file: all the other scanners keep strictly to one sprite, one sprite file.

IRLAM I-SCAN

The I-Scan is a motorised 16 grey 200dpi scanner that has remained the Rolls-Royce of Archimedes scanners for two years. The software now incorporates some neater controls.

The construction of the scanner is the same as ever – a plain box with a roller under which the paper goes. A ribbon cable goes to the podule, and a power supply plugs in too. Unlike the hand scanners, you cannot scan text from a book, as it simply won't fit under the roller. You have to photocopy the page first.

The software works in the normal Risc OS fashion, but it is neat. Setting up the resolution, contrast and so on are done via software. There's one dialogue box, rather than the mix of menus and switches on the scanner used with Scavenger or TechnoSCAN.

Buttons in the dialogue allow you to feed paper forward and backward, and the whole thing seems to work a bit quicker and slicker than with earlier I-Scan software. A neat feature is the 'roll back' option – it winds the paper back to the original starting point after a scan. It's really convenient when scanning several times to find the best contrast setting.

While the scanner can accept any size up to full A4, selection of a smaller area to scan used to be done most conveniently by dragging a box over a full-size preview scan. But now the preview window and the area selection are separate – definitely a backward step. You have to set these up in inches or centimetres. At least there are ruler marks on the scanner itself to help.

TECHNOSCAN II

The original TechnoSCAN was a simple mono scanner and podule combo, and while the hardware in TechnoSCAN II hasn't changed at all, the latest software really does rate the 'Mark II'.

Fitting the podule and connecting the Geniscan scanner is the same as with all the other hand-held units, and the software is loaded from disc. Setting up the scanner before use is a little more straightforward than with the Beebug or Scan-Light machines – the software reads the switches on the scanner itself, so there's never any worries like 'have I set the switches and the software the same?'.

The software also shows you the width and height of the scan you're about to do in inches and pixels. Choose Scan from the menu and away you go. Only one rubbery roller means that the scanner is hard to keep straight on many surfaces, but the LED and a beep give a good indication of when scanning is too fast.

As you scan, the real image builds up on screen (all the other scanners generate a preview only), so you can immediately see if anything is wrong. Once the scan is finished, you can rotate the sprite in 90° steps clockwise or anticlockwise, and trim off any excess by cropping to a box you drag out on screen. Then the sprite can be saved in the usual way.

But there are a host of other options – the software is second only to Scan-Light Plus in flexibility. The palette can be edited to make a dark scan lighter, increase the contrast and so on. And it can be resized, with or without antialiasing, and the mode of the final sprite can be controlled – usually it's a fixed mode 12 or 20. Some of this is a little complex, but even beginners can fiddle about until they get a good scan.

IMAGE QUALITY

Judging from the laser-printed sprites, Scavenger fares least well, due in part to the inability of the software to alter the grey-scale palette, but also due to the low contrast caused by having to set the brightness to almost maximum dark.

TechnoSCAN and Scan-Light Junior produce scans of almost equal quality – how long you fiddle with the controls to get the right dither pattern and brightness makes much more difference than which scanner you use. Scan-Light 256 and the Irlam scanner vie for top rating: both create excellent sprites, but the I-Scan is far easier to operate.

Various scans of two particular images are shown for you to judge yourself – the sprites were put directly on the *Impression* pages and typeset directly through *BAU*'s DTP system. The images were chosen to illustrate the abilities of the scanners on high-contrast images (the Sardinian dancer wears black on a bright sunny day) and on images with lots of detail in the mid-tones (the stones of New College, Oxford are a varied honey-brown stone).

The dancer's shawl also illustrates an effect called colour drop-out. Because the scanners use yellow-green light to illuminate the image, they cannot distinguish pale green from white, or magenta from black – the magenta absorbs the green light and looks black. So the pink floral pattern embroidered on the black shawl cannot be seen easily in many of the scans.

Slight vertical marks and lines are visible on some of the scans – almost inevitable variations in the sensitivity of the CCD sensors and they are particularly noticeable on both the Irlam and Scan-Light 256 true grey-scale devices.

Overall, Scan-Light Junior is good but a bit pricey at £222, Scan-Light 256 can produce scans as good as Irlam at a fraction of the price – but if you need this quality, a motorised scanner is a better bet as it scans much more evenly and is easier to operate. At £175, TechnoSCAN represents the best value for home users: the scanner is the same as all the others, but the software is flexible and easy to use.

HOW THEY WORK

The light from a row of bright LEDs is shined onto the image to be scanned. It's reflected back through a series of mirrors onto the light-sensitive CCD (charge-coupled device) strip.

Hundreds of sensors in this strip produce a series of numbers that are sent to the computer, showing how bright much light reflected onto the CCD from each point on the original.

Rollers underneath measure the movement of the scanner, and when it's rolled down the image enough, another row of numbers are sent from the CCD. Row by row, a sprite is built up – which becomes the scanned version of the image.

PRODUCT DETAILS

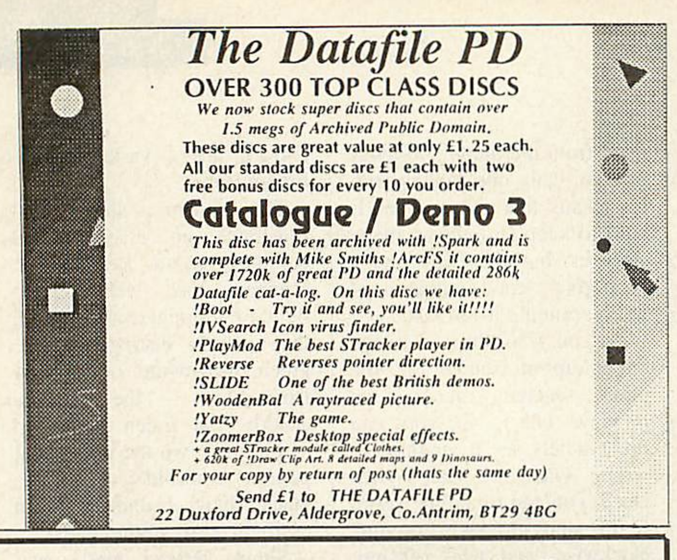
- **Product:** Scavenger
- **Supplier:** Beebug, Tel: (0727) 40303
- **Prices:** A4 model – £398 (for A3000 – £445); A4 sheet feeder – £163; A6 model – £199 (for A3000 – £199)

- **Product:** Scan-light
- **Supplier:** Computer Concepts, Tel: (0442) 63933
- **Prices:** A4 model – £469; A4 sheet feeder £176; Scan-light 256 – £259; Scan-light Junior (A6) – £222

- **Product:** TechnoSCAN II
- **Supplier:** Technomatic, Tel: 081-205 9558
- **Prices:** £175 (for A3000 – £206); TechnoSCAN upgrade – £26.44

- **Product:** I-Scan
- **Supplier:** Irlam Instruments, Tel: (0784) 451192
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Reviewed in Acorn User, June 1991

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The MIDI side provides 16-channel MIDI IN and MIDI OUT and the supplied software emulates the latest version of Acorn's MIDI software. This allows it to work with programs that can run using Acorn's podule and their software.

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Tracker is the perfect complimant to the Sampler and MIDI card. It is a full 8 channel sequencing package that creates stand-alone music modules which will play on any Archimedes without any need for extra hardware. Using the supplied samples (over 150 of them!) or your own, you can create complex pieces of music using Trackers many advanced features including:

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Acorn User February 1991

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More and more multi-user systems are moving to Unix. **Sean Solle** explains how you can get your Arc in on the act

Seeing an A3000 outperform an R260 workstation is impressive, but when it's a piece of software making it happen, it has to be magic.

Like all magic, however, once you know the secret it's obvious. In this case, the trick is to hide a real R260 under the table. In fact, Gnome Computer's *XServer* software allows a roomful of 32-bit Acorn micros to act as *XWindows* terminals when connected by Econet or Ethernet to a Unix machine running *XWindows* software.

The attraction for schools is obvious. Those already using an A400-series machine as a level 4 Econet fileserver can take advantage of Acorn's new Risc iX 1.2 upgrade, although an additional 4Mb of Ram is essential if you don't want the system 'to run like a drain'. Alternatively, the cost of an R260 suddenly becomes justifiable if the performance can be shared concurrently by more than one pupil.

At the other end of the scale it is common to find a network of minicomputers running Unix, and adding an Ethernet card to an Archimedes makes a very cheap XTerminal. *X* was developed for Gnome by Derek MacCauley of Cambridge University's Computer Lab in association with Acorn for exactly this purpose.

The minimum configuration required is 2Mb of Ram, a single floppy drive, and a monitor of your choice. *X* allows the use of all Risc OS screen modes, and I tested the system on both a Super VGA colour monitor with an Atomwide VIDC enhancer, and a 19in high resolution mono monitor. Although standard 14in colour and mono monitors will work, the reduced number of pixels is a little restrictive.

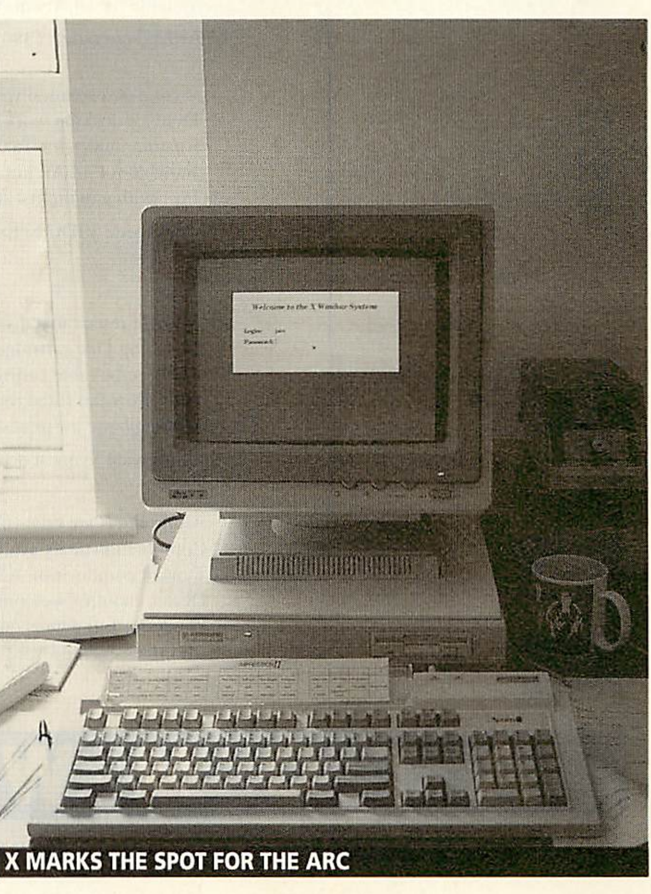
The package consists of three discs – the first contains the application itself, and the other two are packed full of the 75dpi fonts that *X* needs. *X* fonts are supplied as sources which are compiled to bitmaps of up to 100dpi, and Gnome has thoughtfully supplied the font compiler allowing additional fonts to be added as and when needed.

There is no need to keep fonts on the local machine's disc as they can be transferred from the host if necessary. This is just as well, as the full distribution tape (everything in the Unix world is supplied in the first instance on magnetic tape) contains hundreds of megabytes of fonts.

Also included in the package is the latest version of *xdm*, a program which R140s need to talk to the Xserver.

The 40-page manual is thorough, covering virtually every twiddlable option, as well as pointing the reader to suitable introductory books on *X*.

Before double-clicking *!X*, the *Internet* application needs to be activated. Besides being responsible for providing the complicated communication protocols required between the Archimedes and host, this


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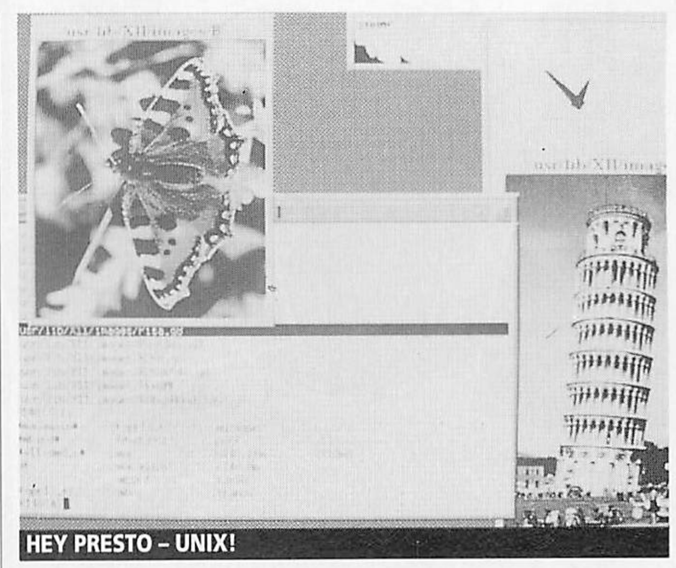
application is also part of Acorn's TCP/IP suite. As well as accessing Ethernet and Econet, it allows the XServer to operate over a serial line – not something you'd want to do often, although the idea of logging onto an XHost via a V42bis modem could be an impressive demonstration!

Starting the XServer installs the inevitable X logo on the icon bar, and from here it is possible to choose which host to log onto. It's also possible to search for all possible hosts. On a large network with domain name servers this could take an extremely long time. Therefore a user-selectable timeout period is provided. Testing the system in Cambridge University's Computer Lab I found more hosts than could fit on the menu; this is a limitation of Risc Os, not the application.

Clicking on the X icon immediately causes an XLogin screen to occupy the whole display, leaving Risc Os suspended. Double-tapping the BREAK key acts as a hot-key, returning to the desktop with everything exactly as it was left. Using this method to switch quickly and efficiently between local and remote computers is a very sensible arrangement. To run the XServer within a Risc Os window would have been very clumsy to use, and no doubt slower in operation.

However, returning to the *X* display reveals an annoying feature – the pointer initialises itself at the top left-hand corner of the screen, not where I'd left it. Since an XWindow is only active when the pointer is over it, I found myself unknowingly typing into thin air! Gnome says that this isn't really considered to be a major problem, but that it will be fixed anyway.

Once logged into the host, it feels like you're using a real XWindowing machine, and it's easy to forget that you're actually using a remote terminal. In fact, using *X* to access an Acorn Risc iX workstation


HEY PRESTO – UNIX!

improves the system's performance, as the host no longer has to worry about updating a large bitmapped screen. It's rather like having a second processor on a Beeb.

Understandably, over a busy Econet it is only reasonable to expect a drop in speed, but do bear in mind that Econet is a quarter of the cost of Ethernet.

Before connecting to the host, the type of screen display required may be specified, with the usual considerations concerning number of colours against the response time of the display. An exceedingly useful feature is that up to eight multiple screens or heads may be configured, and switched to by pressing BREAK and a numeric key. These screens are completely independent, and can be of different pixel or colour resolutions. Each can be logged on to any host on the network, or even all to the same host – a cunning feature.

The XServer is a delight to use, and it's quite easy to forget that you're using an Archimedes. It also displays the potential of the Arm chip; similar packages for PCs are over twice the price and, although PC Ethernet cards are a good deal cheaper than Acorn's, they really can't hold a candle to *X*.

If you have an existing network of Arm-based machines and you have been contemplating branching out into Unix, or if there's a big Unix box down the corridor somewhere, then *X* is a must.

THE RISE OF UNIX

Over a decade ago, when only a few schools had computers in broom cupboards, users were already encountering the problem of the non-compatibility of various programs. Wasn't it impractical for the user that different makes of computer couldn't run each other's programs?

Usually at this point the cognoscenti would launch into a hand-waving description of processors, instruction sets and registers, explaining why a program for that computer wouldn't work on this one.

Although the commercial success of the PC brought an end to this problem, and established the credibility that businesses needed before they would invest in the new technology, the ensuing enforced compatibility locked manufacturers into a closed architecture with the end result that ten-year-old design decisions were hindering development.

Many schools, following the example of the real world, bought PC compatibles and taught children the joys of MS-Dos applications, only to find that today as the pupils become employees, their employers are beginning to move away from the limitations of the PC.

The commercial world is beginning to catch up with universities and other research establishments, where computer scientists have long had the computing power only now appearing in offices. As this power increases everything, including operating systems, can be written in high-level languages and compiled for different processors. That is the secret of open systems, and also provides a solution to the problem of programs that were written for specific machines being incompatible with others.

Unix is the best known and most widely used example of an operating system of this type. Given enough processing power and a C compiler, almost any computer can run Unix. It's hard to find a university that doesn't have at least one Unix machine and, as a result, there are many applications that are free to the academic community, including some of the finest software development tools and languages available.

Unix is a true multi-user operating system. By connecting a number of terminals multiple users can access the machine simultaneously, with each terminal behaving as a separate computer.

It is this multi-user capability that has attracted business applications such as accounting to Unix; in an office environment where data needs to be shared easily between individuals, a single central computer with multiple terminals can be far more cost-effective than a network of PCs with a central fileserver.

A criticism often levelled at Unix is that it is rather overwhelming for novices, with bizarre and obscure abbreviations for commands, such as ls to list a directory, and the ability to completely retailor the command line interface.

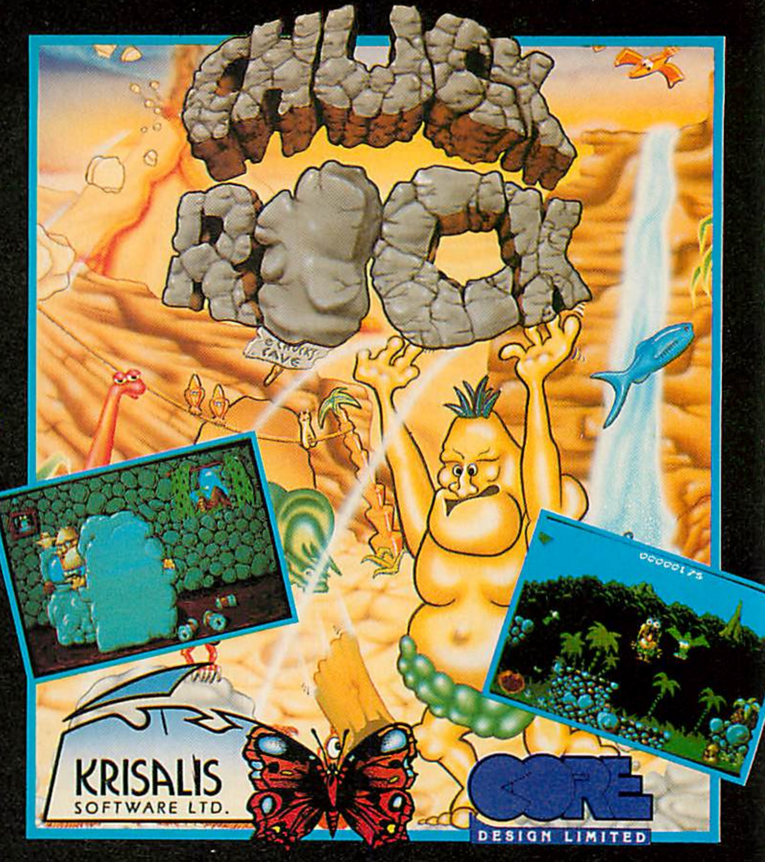
However, the XWindowing system supplied as standard with Acorn's Risc iX is just as simple to use as Risc OS although a great deal more sophisticated and offers easy access to Unix's potential.

PRODUCT DETAILS

- **Product:** X – Arm Xserver version 11 Release 4
- **Price:** £199; £1000 for a 20-machine site licence
- **Supplier:** Gnome Computers Ltd, 25A Huntingdon St, St Neots, Cambs PE19 1BG. Tel/Fax 0480 406164 Email: support@gnome.uucp



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STARTING OVER

DAVE FUTCHER examines two books that may make you into an Arc expert

Getting to grips with a new micro can be tricky, even when it's a friendly machine like the BBC A3000. People with five years experience of the BBC model B find the new wimp-based world of 32-bit computing confusing.

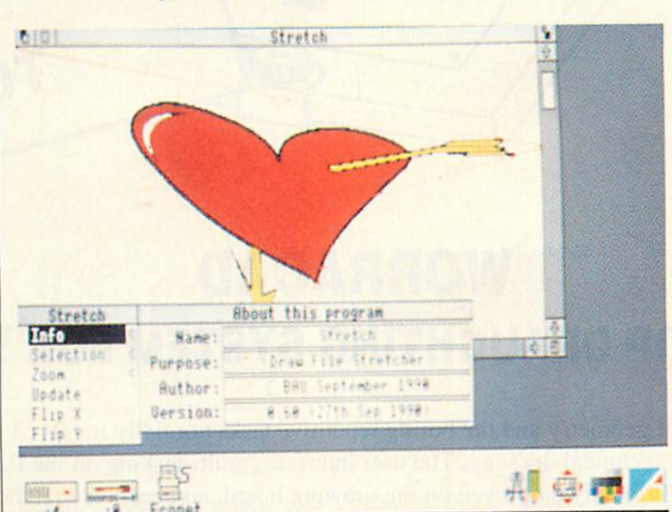
Although the Archimedes and BBC A3000 have a good Welcome Guide, which helps a bit, they find that the user guide is really more useful for reference when they have mastered the new machine. There is a real need for something to bridge that gap.

Anne Rooney's *Archimedes First Steps*, published by Dabs Press was a first attempt at the introducing the Risc OS and the bundled software provided on application discs 1 and 2. Now Sherston Software, one of the leading educational software publishers, has produced a series called, appropriately, *Help*. The first two are *Help*, sub-titled: *A teacher's companion to the Archimedes and A3000*, by David Eccles and *Draw_Help* by Geoff Alston and David Eccles.

GETTING HELP

Help manages to explain in a simple and straightforward way all that a beginner needs to know about using an A3000. The only assumption made is that you have managed to put together the computer, monitor and mouse and plugged it in. Although aimed at teachers getting to grips with their new classroom micro it will put an end to anyone struggling with the Acorn user guide.

Help is in two sections, the first gives a broad introduction to the computer while the second contains tutorials on two of the applications supplied with the computer. After a brief introduction the reader is taken gently through a series of exercises that cover topics including formatting, copying, file management and configuring the computer, This section of the book uses very clear language and virtually all jargon has, thankfully, been avoided. Progressive tasks are worked through and even difficult concepts are made clear.



GOING BACK TO !DRAWING CLASSES

The second part of *Help* covers two of the applications provided with the computer *Draw* and *Paint*. These are also covered in a tutorial format. Nearly 40 pages are used to provide an easy-paced introduction with samples to work. The companion disc has sample files that can be used to support this work.

Help is an ideal companion for anyone starting off with an A3000. It will provide them with the confidence to get to grips with the power of their new micro – the introductions to *Draw* and *Paint* are first class. It's rather a shame that Acorn's *Maestro* did not feature as a simple tutorial too.

PRODUCT DETAILS

- **Product:** Help
- **Author:** David Eccles
- **Supplier:** Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire, SN16 0LH Tel: (0666) 840433
- **Price:** £7.95
- **Comments:** Good introduction to the A3000 for teachers

LEARNING TO DRAW

There is no doubt that *Draw* is an extremely powerful and versatile piece of software. Unfortunately, Acorn's Risc OS user guide explains each of the features of the package, but absolutely no tutorial is provided on how to use them. Hence a valuable piece of software is often not used to its full potential.

Draw_Help sets out to explain how to use the application's many features. The pack consists of a 96-page A5 book and a *Draw* menu reference card. The first part of the book explains with particular clarity what *Draw* is and how it works. It is particularly good at when covering the Toolbox and the Select mode. The majority of the rest of the book, some 50 pages, is tutorial-based and, due to Sherston's background, many of these have an educational flavour. Nonetheless they will be useful for anyone trying to get to grips with *Draw*.

Each tutorial shows in considerable detail how the task in hand can be accomplished. The design of the invitation card is particularly good at getting experience with using text in *Draw*. The tutorial based on the construction of a weather map gets the user to design new weather symbols to complement those provided.

The two discs that accompany *Draw_Help* contain all the files required to complete the tutorials with the clip art and text supplied. In addition the first disc contains *Draw*, the System folder, a Fonts folder with two new fonts Junior and Olivia and a printer driver folder containing *PrinterDM* and *PrinterIx*. Disc two contains a number of folders of clip art created in *Draw*.

The *Help* resource packs from Sherston are first-class publications. They will ensure that those users who find the Acorn user guide unhelpful will be led step-by-step into understanding their micro and some of its application software. Indeed, some experienced users may well find *Help_Draw* useful as it goes beyond the Arc user manual.

PRODUCT DETAILS

- **Product:** Draw_Help
- **Authors:** Geoff Alston & David Eccles
- **Supplier:** Sherston Software
- **Price:** £15.95
- **Comments:** Introduction to Draw that could well prove to be invaluable to new and experienced Arc users alike

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SOFTWARE ON THE DOLE

Good software need not cost a fortune. **CHRIS DRAGE** explains how you can make your money stretch

After spending a considerable sum on a new computer system people often find themselves wondering what software to buy and, more importantly, whether they can actually afford *any*.

If you know where to look, however, there is plenty of good software available for less than £10. Acorn's *Educational Software Catalogue* lists hundreds of titles for the Arc, and you should also check the small ads at the back of *BAU* for other suppliers. Before Beeb or Master owners groan and turn the page, let me add that there's cheap software around for you too.

Whatever your needs, be it for home use, primary or secondary schools, or for special needs, Northwest SEMERC is a good place to start looking. Their *Computers for Special Needs* is a handbook of resources for all learners.

For children with severe learning difficulties the *Single Switch Trainer* and *Wiper* programs reinforce the idea of cause and effect, and the *Alan Nixon Keyboard* and single input *Switch* programs are a must for children who need to use a Concept Keyboard.

A number of packages that will be of interest to primary schools include *Wordsearcher*, a program that creates grids of letters; *Easel 2*, a colour painting program; the *Genesis Christmas Disc* which lets you write a Christmas story to the sound of a carol; a collection of programs from the MEP pack called *Infant Disc* and a jargon-free database, *Lists*.

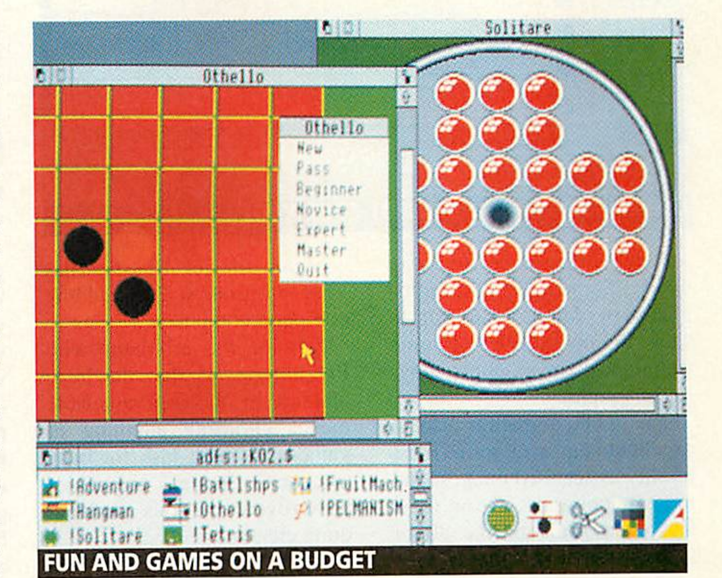
Moving In, *Electricity In The Home* and *News Extra* are also useful programs. Wherever possible all of Semerc's programs have an option to connect them to a Concept Keyboard. *Big Screen* and *Screen Viewer* are two utilities that partially sighted Arc users may find useful, as they magnify the image on the screen.

Another reliable source of cheap Arc software is David Pilling, with the bonus that for every four discs you buy, you get one free. Any school running a chess club should have David's *Wimp Chess*. It plays an excellent game and the board is easy to alter. *Starchart* will find a ready use in secondary science courses. Star maps can not only be calculated and plotted, but also exported as *Draw* files into other Risc OS applications. *Worldmap* plus *The World Digitised* enables you to produce a map of any part of the world, colour it in *Draw* and load it into another program.

Undoubtedly David's most useful utility is *Spark 2*, a file archiver whose compression and decompression routines enable huge numbers of files and directories to be kept on one disc. As it uses Ram transfer and works in the background, files can be dragged out of the archive directly into applications. The value of *Spark* becomes self-evident when it comes to storing sprites, and is shown to good effect in David's disc packs which contain hundreds of pictures. His packs 1, 4 and 5 represent excellent DTP and hypermedia resources.

Design Concept produces high-quality software at affordable prices, and is currently marketing 15 original outline fonts at £2.50 each. They don't claim to be PostScript compatible but they are supplied in a Morefonts directory for use with *Fonts*, automatically adding new fonts to the list when selected.

Among Design Concept's utilities, four programs are particularly worth a mention. *Fontlist* takes the tedium out of hunting for a particular font by producing a *Draw* file with



FUN AND GAMES ON A BUDGET

examples of each of your fonts, in words of your choice.

Keycaps helps you preview any fonts you have at a glance, and *Freehand* transfers freehand mouse-drawings or scribbles to *Draw* for modification, and from there to DTP and hypermedia applications. Finally, *Shade* does exactly what I have always wanted to achieve; it produces smooth graduated colour fills within a document. Fine grey-scaling is possible and again, import into *Draw* will allow you to scale, size, copy and mask the shaded rectangle.

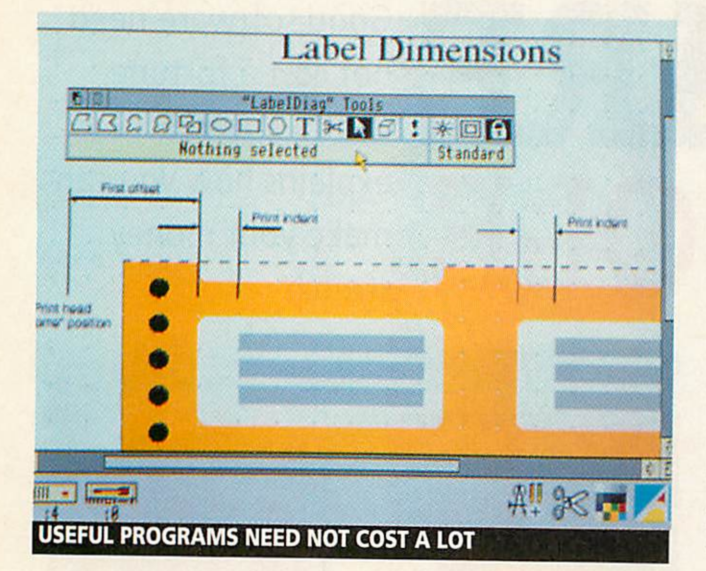
For clip art created and assembled primarily for educational users, try the *Gallery Discs* from Emerald Publishing and the *DTP-Images 1-7* discs from G.A. Herdman Educational.

PUBLIC DOMAIN

Public Domain (PD) software is an extremely useful source of software, especially for schools as it is so cheap. Here you will find bespoke programs with an educational content, DTP resources such as fonts, sprite images and drawfiles, utility software and logic and strategy games. However, when using PD software be aware that, firstly, none of it is guaranteed to work as you may expect, and secondly not all of it is Risc OS-compatible let alone Risc OS-compliant. But much of it performs well and will return you to your desktop environment once quit correctly. Another factor to keep in mind is that if there is any documentation at all with the programs it will be in the form of Read Me files, leaving you the task of printing it out if required. With over 300 discs full of PD software, though, selling at around £1 per disc or cheaper, you can't really go wrong.

PD has several guises. There is for example public domain software which has the author's copyright attached – this is freely copyable but cannot be changed in any way. Programs sold as shareware can be copied but the recipient is requested to make a small, voluntary payment to the author of the program in return for its use and for free updates. Lastly, there is careware in which the voluntary payment made is given to charity.

There are many PD programs available, often with



USEFUL PROGRAMS NEED NOT COST A LOT

several variations on the same theme. Sometimes this multiplicity of demos is useful to show the possibilities of some techniques, for example ray-traced graphics.

The public domain is also an excellent source of sprite files, usually as scanned images, and more importantly, *Draw* files. However, some of the 30 or more fonts in the public domain are simply renamed copies of existing outline fonts which have a company copyright.

Among the utilities you will find many gems like *Translator* and *PCdir*. *Drawplus* is an enhanced version of Acorn's *Draw*, although less reliable than the original.

PD SUPPLIERS

The Acme PD Software Library is rather new to the scene and should have a catalogue by the time you read this. I received a disc of some interesting PD games involving skill and concentration, plus many others which vary in suitability for school use. There are some very good adventures including the *Great Adventure* and the classic *Colossal Cave*.

Prime PD is another newly formed PD supplier, run by 16-year-old Ian Kershaw who has identified one or two programs as of interest to schools. *Europe* provides useful geographic information about each country in the continent. *Hyper* is a hypertext program which could be a cost-effective means of introducing teachers and pupils to the idea of mixing media. Another disc contains a lot of *Maestro* files – an inspiration for budding computer composers?

One of the problems with PD libraries is that the huge amount of material available makes choosing anything of value a difficult task for busy teachers. Some companies have overcome this problem quite elegantly.

Arch Angel has the best organised catalogue of any of the PD suppliers I've seen. You can scroll through and search the extensive list of programs, marking those you require. The program will then calculate the total cost of your choices and print an order form.

Arch Angel has a full list of PD software which is worth exploring in detail. Despite having only brief program descriptions, the excellent catalogue disc helps considerably in ordering programs.

Arcaynia PD Archimedes discs cost a little more, but the company is well-organised with an automated ordering system provided on disc and a thorough printed catalogue.

This company is committed to helping schools. It has a mini-catalogue devoted to those titles identified as educationally beneficial, will supply bulk orders at lower prices and accept official orders. A sample disc I received contained a number of interesting data-handling programs (database, address book, bank account and phone book – to name a few.

In addition to its usual PD material, Datastream is starting a disc-based magazine containing articles and other compressed new PD programs and resources which may be worth watching. This company too has a massive library of Archimedes software but lacks the neat ordering of Arch Angel' s catalogue.

If you need software in a hurry, The Datafile PD has the fastest turn-around of orders I have discovered to date. In addition, the disc-based catalogue contains almost all the PD software available. An automated selecting/ordering program is being completed which should make this company the easiest from which to obtain software.

The Skyfall Arc demo discs and printed catalogue are among the best available. This company too takes care to check its 'products' for quality and legality and dispatches orders promptly. The company markets a disc-based magazine entitled *Arena* which includes news, reviews, programming techniques and hints & tips and runs a PD club which entitles members to half-price discs and catalogue updates. Skyfall submitted a large number of sprite/*Draw* files which any school would find of value for DTP/hypermedia work and some of the ray-traced animations offer a superb introduction to this branch of computer graphics.

The curiously named Ozone Friendly is another PD supplier establishing a reputation for fast service, taking care to ensure that discs are virus free etc and will load with no trouble. With Ozone Friendly you can't select and order automatically. However, they selected a number of very useful PD utilities for me including some for reading/writing PC and Atari discs and translating graphic screen formats.

Lastly, BBC B/Master 128 owners may be feeling left out at this point. BBC PD has a catalogue and sampler disc to whet your appetite for approximately £1.50. Its organiser, Alan Blundell states that his aim is to foster more self-help in a market which is virtually dead. This is particularly good news for schools who possess by far the majority of eight-bit machines. He is also keen to boost the educational content of the BBC PD library for parents who, he believes, bought their BBCs and Masters for more than simply games. Of the hundred or so titles available there is a good cross section of all BBC B computer applications. If you have developed some software, why not get in touch with Alan and share it with others?

Apart from BBC PD, all the Archimedes PD suppliers have much the same software libraries. What differentiates between them is organisation and customer care. Once you are confident with a supplier you can buy an amazing mass of software, for no more than the cost of a disc and p&p, in which you are sure to find a gem or two.

SUPPLIER DETAILS

GENERAL SOFTWARE

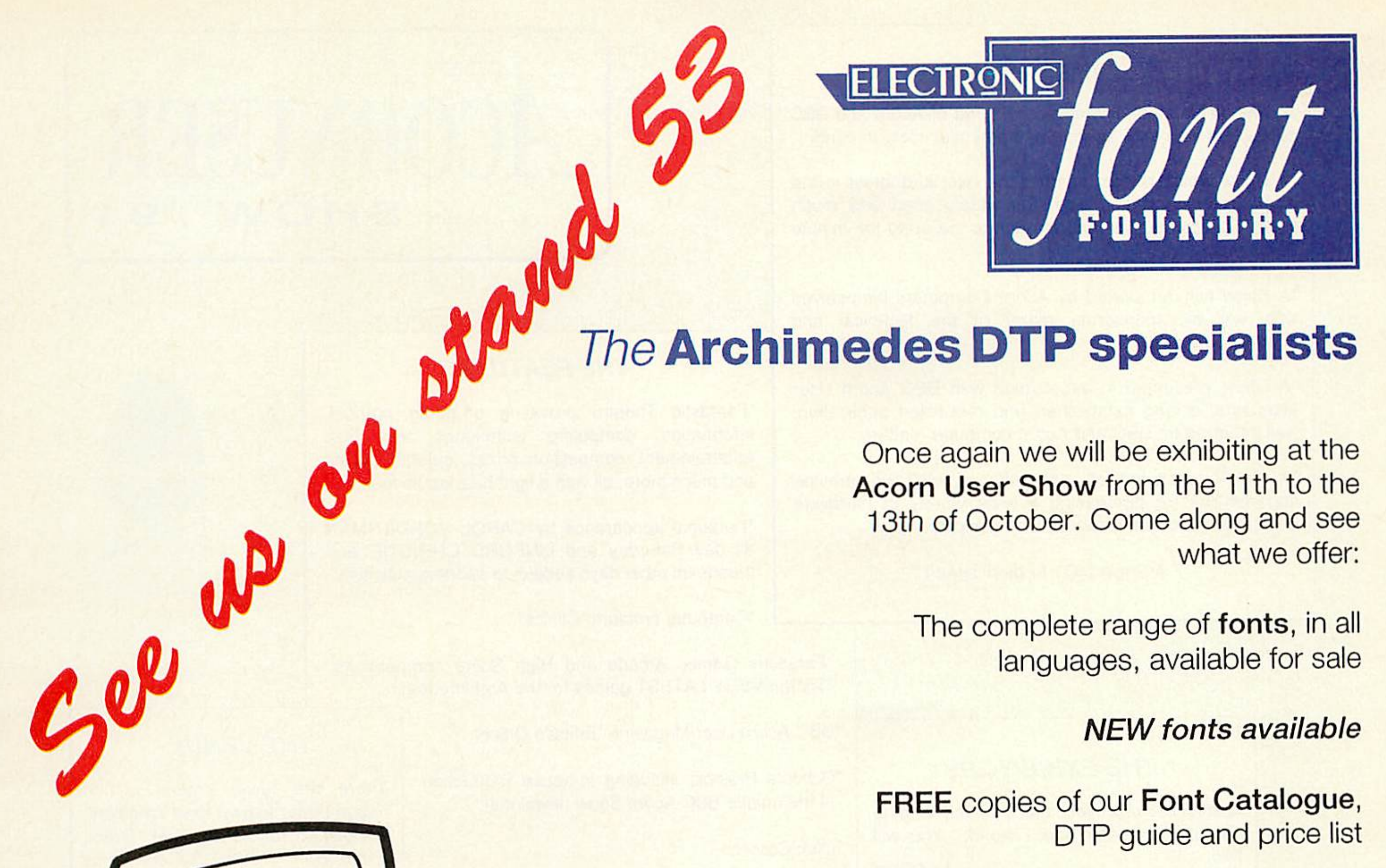
- **Northwest SEMERC:** Fitton Hill CDC, Rosary Road, Oldham, OL8 2QE.
- **David Pilling Software:** PO Box 22, Thornton Cleverleys, Blackpool, FY5 1LR
- **Design Concept:** 30 Oswald Road, Edinburgh, EH9 2HG
- **Emerald Publishing:** 46 Silverwood Close, Cambridge CB1 HA
- **G.A. Herdman Educational Software:** 43 St. Johns Drive, Clarborough, redford Notts., DN22 9NN

PD SUPPLIERS
Archimedes/A3000

- **Acme PDSL:** 17 May Avenue, Wollaton, Nottingham, NG8 2NE
- **Arcaynia:** PO Box 1927, Sutton Coldfield, B74 3QZ
- **Arch Angel:** The PD Library, 9 Chancel Court, Chancel Lane, Pinhoe, Exeter, Devon, EX4 8QE
- **The Datafile PD:** 22 Duxford Drive, Aldergrove, Co. Antrim, BT29 4BG
- **Skyfall:** PO Box 2220, Birmingham, B43 5RZ
- **Ozone Friendly PD:** 180 Cumnor Hill, Oxford, OX2 9PJ
- **The Data Stream:** 32 Hollinwell Avenue, Wollaton, Nottingham, NG8 1JZ
- **Prime PD:** 29 Tulworth Road, Poynton, Stockport, Cheshire, SK12 1BQ

BBC B/Master 128

- **BBC PD:** 18 Carlton Close, Blackrod, Bolton, BL6 5DL



The **Archimedes DTP specialists**

Once again we will be exhibiting at the **Acorn User Show** from the 11th to the 13th of October. Come along and see what we offer:

The complete range of **fonts**, in all languages, available for sale

NEW fonts available

FREE copies of our **Font Catalogue**, DTP guide and price list

Examples of our range of **Indic, Hebrew, Cyrillic** and **Greek** fonts including keyboard drivers

A range of computers, monitors, printers, hard drives, SCSI drives...

Complete **Professional Desktop Publishing Systems** including: hardware, software, fonts and training

Our technical staff have many years experience in the Archimedes computer range and they will be on hand to give technical advice about hardware, software, Desktop Publishing and graphic design

- The Electronic Font Foundry produce a wide range of fully hinted, ***PostScript®*** compatible fonts for the Archimedes.
- We supply a ***FREE*** font catalogue, ***FREE*** DTP guide and ***FREE*** advice.
- Why not ring us or write to us for your copy.

The **Electronic Font Foundry**

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* THE SHOW *

*A unique Show dedicated to the world of Acorn and BBC computers with both existing and potential users in mind.

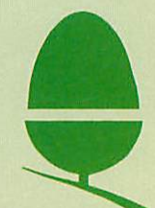
*A Show which brings together the best and latest in the Acorn market ranging from the widely used and much loved 8-bit computers right through to the up-to-the-minute 32-bit machines.

*A Show fully supported by Acorn Computers themselves who will be sponsoring many of the technical and informative activities.

*A Show presented in association with BBC Acorn User Magazine, a long established and respected publication, well informed on BBC and Acorn computer matters.

*A Show designed to entertain as well as provide opportunities for purchasing a wide variety of hardware and software, often at special Show prices.

* A Show NOT to be missed!! *

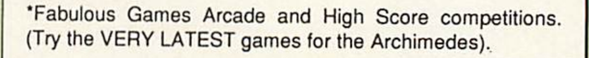


* THE FEATURES *

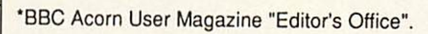
*Fantastic Theatre providing on-going product information, computing techniques and tips, entertainment, competition prizes, celebrity spots and much more, all with a light hearted flavour.

*Personal appearance by CAROL VORDERMAN all day Saturday and LINFORD CHRISTIE and friends on other days subject to sporting activities.

*Computer problem "Clinics".



*Fabulous Games Arcade and High Score competitions. (Try the VERY LATEST games for the Archimedes).



*BBC Acorn User Magazine "Editor's Office".

*Schools Projects including in-house production of the unique BBC Acorn Show newsletter.

*Club Corner.

*Mock Classroom with Schools' activities.

*Rest-Your-Legs lounge area.

*Competitions.

*FREE Show Guide with all adult tickets.

MUCH, MUCH MORE

* THE EXHIBITORS *

*Exhibitors represent many of the leading companies in the Acorn world. You will find;

*Software houses and distributors with programs covering the range from games right through to sophisticated desk-top publishing or image processing.

*Acorn appointed dealers with their own special offers and deals, and some from Acorn Computers themselves.

*Special peripheral manufacturers and distributors.

*Publishers and Clubs.

*Consumables and Accessories.

MANY MORE

* THE VENUE *

There are fewer places in the nation better known than Wembley. Renowned for its Stadium, Event, Exhibition and Conference facilities, the BBC Acorn User Show '91 will provide both visitors and Exhibitors alike with a first class venue.

Excellent Rail, Road and Air links make it easy for visitors to reach Wembley. Massive on-site parking (NCP) is available for those travelling by car and a free shuttle bus will operate from Wembley Park Underground Station.

A variety of snack bars and restaurants will provide light refreshments throughout the open days.

* THE CONCERT *

A FABULOUS 60's CONCERT will take place in the Grand Hall of the Conference Centre on Friday evening (11th October 1991) with legendary groups HERMAN'S HERMITS, and THE BRUVVERS with the great MIKE BERRY.

Bring back the memories, sing along with your old favourites and generally let your hair down. See the Exhibition during the day and stay on for the Concert in the evening. DON'T MISS THE FUN!

Why not see the Concert and stay in London overnight and visit the Exhibition on Saturday. A great way to enjoy a trip to the Big City.

Concert tickets are all one price at a modest £10.50 each and are available from the Wembley Box Office - Tel. 081 900 1234.

* TIMES AND PRICES *

Tickets at Door;

Adult	£6.00
Under 16	£4.00
Family (2 Adults & 2 Children)	£16.00
Under 5's	FREE

Advance Tickets - use coupon below

FRIDAY 11th October 1991	- 10.00 a.m. - 6.00 p.m.
SATURDAY 12th October 1991	- 10.00 a.m. - 6.00 p.m.
SUNDAY 13th October 1991	- 10.00 a.m. - 5.00 p.m.

Please note - Pushchairs are not allowed in the Exhibition Halls.

WEMBLEY
CONFERENCE AND
EXHIBITION CENTRE

ADVANCE TICKET APPLICATION FOR THE BBC ACORN USER SHOW

Please Rush me;
.... Adult Tickets at £5.00 Advance Discount Rate
.... Under 16 Tickets at £3.00 Advance Discount Rate
.... Family Tickets at £13.00 Advance Discount Rate

I enclose Cheque/Postal Order for £................ made out to SAFESELL EXHIBITIONS LTD

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RETURN THIS FORM TO SAFESELL EXHIBITIONS LTD, MARKET HOUSE, CROSS ROAD, TADWORTH, SURREY, KT20 5SR TEL. 0737 814084

NEW FONTS FOR OLD

The Arc comes equipped with 13 high-quality outline fonts. **GRAHAM BELL**, however, reckons that you can't have too much of a good thing

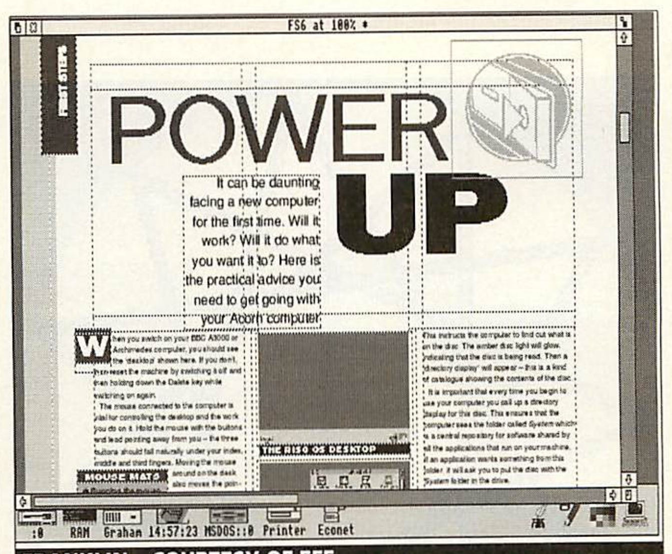
There are two popular methods of drawing text on a computer screen.The Archimedes uses smooth 'outline' fonts rather than the blocky bit-mapped characters used by many other computers. To use these outline fonts on your Arc, you need the font manager modules supplied with any of the Arc DTP packages and many other new items of software. The fonts can be seen on-screen and printed at any size without any loss of quality – it's a system that PCs and Macs are only now catching up with.

The font manager modules are usually supplied with a core set of 13 fonts (or more correctly, typefaces): Corpus, Homerton and Trinity in four weights each, plus Selwyn. These equate to Courier, Helvetica, Times and Zapf Dingbats in the 'real' world, but the names of the Acorn fonts have to be different for copyright reasons. The core font pack can also be bought separately.

It's easy to add new fonts. Acorn supplies two add-on packs, containing Newhall (New Century Schoolbook) and Sidney (a Symbol font). But there's a range of other options: Beebug, Computer Concepts and Longman Logotron supply fonts either with their own DTP software or separately, and Electronic Font Foundry specialises in Arc-compatible faces.

These extra fonts fall into two categories – the equivalents of traditional fonts are compatible with Postscript versions, and those that don't exist outside the Archimedes world. The latter are decorative faces, or intended for special purposes like education, and cannot be printed on Postscript laserprinters. And the faces vary in quality.

Apart from the outlines, which can be well-drawn or downright ugly, the character set might not be complete. Missing Icelandic characters may not matter, but missing fractions like ¼ and ¾ could be important. The quality of 'hinting' can also vary. Hinting means the font software tweaks the character outline to make it look better at the chosen scale – good hinting improves the look of small text on-screen and on dot-matrix printers at lower resolutions.



FRANKLIN – COURTESY OF EFF

Beebug's *Ovation* DTP package is supplied with the Acorn font manager modules, but Beebug's own selection of Postscript-compatible fonts. Some are the equivalents of the Acorn 'core' fonts – for example SwissB is equivalent to Homerton (Helvetica). Others are new, like Vogue (Avante Garde), Bookmark (Bookman) and Chaucer (Zapf Chancery). Ovation users supplied with only a few of these Beebug faces can purchase the others at a nominal price.

Computer Concepts supplies the Acorn core fonts with Impression, together with a couple of its own. Pembroke is a version of Palatino, and Greek is a Symbol font intended for use with Equasor.

One of the difficulties of publishing on the Archimedes is when text written on another machine is in SwissB for example, and you have only Homerton on your Arc. Although the two fonts are for all practical purposes identical – they are both versions of Helvetica – there is as yet no software to make an automatic translation. The text appears in the system font or Trinity, or some other default instead. You have to edit it manually to convert it to your version of Helvetica. The same confusion can occur with Pembroke and Paladin, or with SymbolB, Greek and Sidney.

Electronic Font Foundry specialises in Acorn-style fonts: many of its faces, being original and decorative, can't be printed on Postscript equipment, but print perfectly well with direct-drive laser printers, Laserjet-compatible devices and dot-matrix printers.

EFF also has a wide range of faces fully suited to professional publishing, many of which cannot be obtained elsewhere. For example, there are excellent versions of many of the 'classic' faces like Plantin, Baskerville and Garamond, all properly drawn, hinted and compatible with Postscript. The only alternatives to the Latin1 character set also come from EFF – there are alphabets for many other languages – but you could find it impossible to print these because many special characters are unavailable in Postscript faces.

Many other firms offer smaller selections of fonts unique to the Archimedes, though most are only suitable for decorative use or some special applications. A good example of these are Longman Logotron's Semaphore and Morse faces, which might find places in education, and Design Concept's Celtic font.

These are often well-drawn and hinted, but the only way to output them via Postscript is to turn each character into an outline using a utility like Computer Concepts' *FontDraw* or *FontFX* from the Bromley Datastore.

Next month, I will explain how you can get these extra fonts to work for you.

SUPPLIER DETAILS

Fonts mentioned in the text are supplied by:

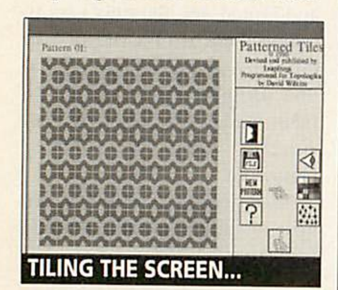
- **Beebug**
  Tel: (0727) 40303
- **Computer Concepts**
  Tel: (0442) 63933
- **Electronic Font Foundry**
  Tel: (0344) 872923
- **Design Concept**
  Tel: 031-668 4518
- **Longman Logotron**
  Tel: (0223) 323656

THE ART OF THE MATTER

You've seen the exhibition, now load the software. **DAVE FUTCHER** casts his eye over the package that marries fields as diverse as fine art, maths and computing

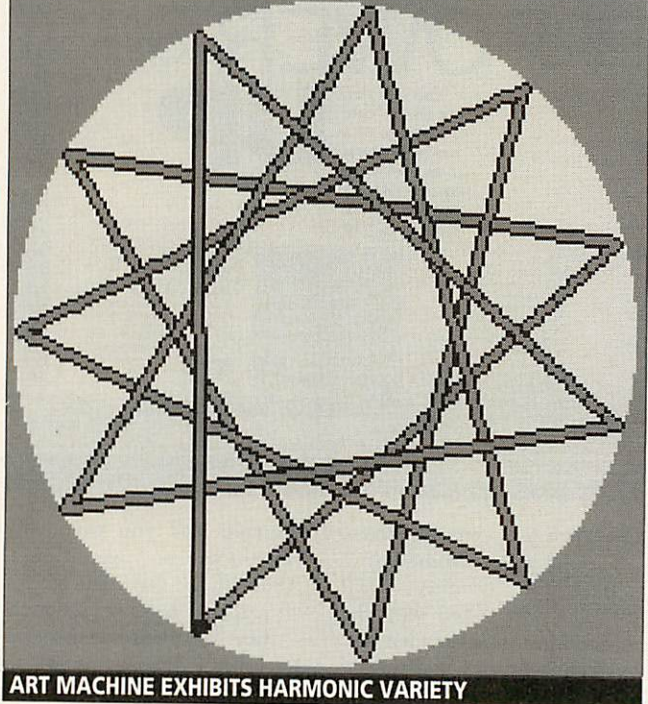
The Art Machine was an art exhibition that started its life as part of Glasgow's 1990 European City of Culture celebrations. Unlike most exhibitions, this one didn't just invite children to get interested and excited about art but to take part too. Over the last year it has developed into a travelling show that has visited most major cities in the UK. Its most popular venue to date was the Barbican Centre in London where there were 43,000 visitors in two weeks.

A central part of the exhibition is a bank of BBC A3000 computers running a suite of software called, appropriately, *The Art Machine*. These programs were developed by Derek Last, Leapfrogs, Topologika and Central Television. The programs let children and other visitors to the exhibition explore artistic and mathematical worlds.



TILING THE SCREEN...

These are not open drawing or painting programs like *Revelation* or *Atelier*. Instead, each one operates within a given set of parameters that allow the user to explore and experiment. All the programs use some form of patterning, sequencing, or symmetry to produce visual images.

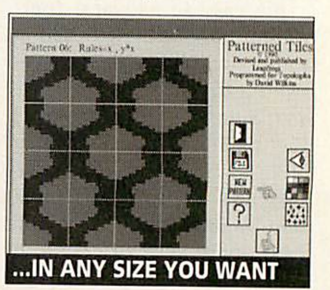

ART MACHINE EXHIBITS HARMONIC VARIETY

The Art Machine package contains 10 programs: Pattern Tiles; Snowflakes; Moving Squares; Cyclic Story; Fractal Trees; Weaving; With Pattern; Bounce; Tiling; and Tracks.

Pattern Tiles allows you to explore the fascinating range of patterns that can be produced from simple sets of two-coloured square tiles. A set of eight are provided or the user can construct their own. The tiling process can be manual or automatic. If manual is selected, you can choose for each cell the tile you want and its orientation. It's much simpler and less tedious to use the automatic tiling process and this is done by using rules to determine which tile will be placed in which cell and in which orientation. The rules are expressed using the x and y cell co-ordinates.

Snowflakes allows you to explore the mysteries of fractals without picking up a pencil. Nine basic snowflakes are provided, ranging from a triangle to a seven-pointed star. After one of these is selected, the computer is asked to alter this shape using one of the four transforms – two square and two sawtoothed waves – that it offers. These patterns can be further altered by the user for a greater variety of effects.

Moving Squares offers a great way for children to explore geometric rotation and translation. The program will allow you to create your own animated film about a square with up to a thousand sequences. You can choose its starting size, colour and position and select the movements and changes you want it to experience. Once the film has been created you sit back and watch the square spin, slide and change size as it moves around the screen.



...IN ANY SIZE YOU WANT

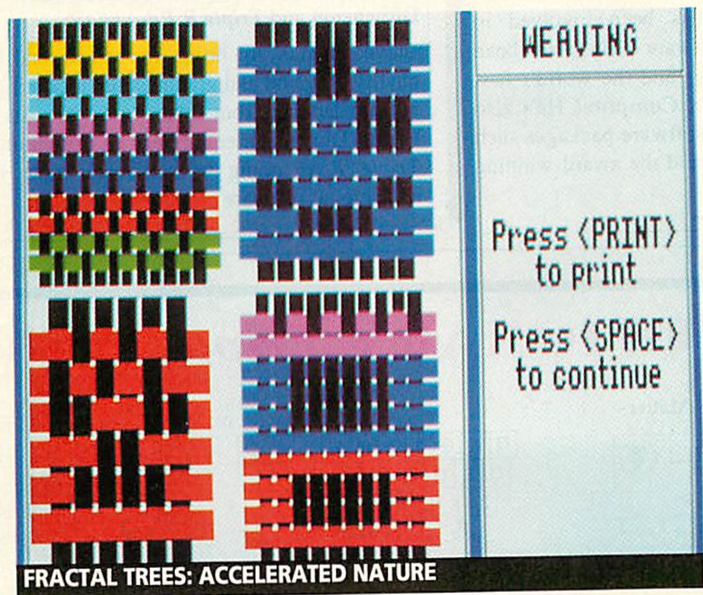
Cyclic Story lets you create animated stories that have no beginning or end. They sort of start in the middle and run. With the program you tell the story through animation – it's the story of squirrels, acorns, birds, Spaceship Earth, a house in the forest and destruction.

Fractal Trees puts the user in charge of a tree. You start by choosing a season (summer includes fruit), and this is followed by where you want it to grow, how tall the trunk will be, straight or leaning, branch length, years to grow. A click on the watering can icon and off it goes. It is even possible to plant multiple trees. Fractal Trees is a really enjoyable way of introducing children to fractals.

Weaving enables children to experiment with geometric



WEAVING: JUST LIKE TRADITIONAL METHODS



FRACTAL TREES: ACCELERATED NATURE

forms and patterns connected with weaving. The weaving is undertaken on the screen using the over/under processes used in traditional weaving. The program first offers a choice between strip weave and thread weave. The maximum and minimum values for the weft (horizontal) and warp (vertical) has to be set and the actual number of threads and their colours chosen. The actual weaving is achieved by either choosing manual or programmed mode. The latter is very good for using with preset patterns that have been designed in advance.

With Pattern allows complex repeating designs like those found in wallpaper and curtain material to be worked on. A basic unit pattern is constructed on either an 8x8 or 9x9 grid, which can then be repeated 63 times to fill the screen. Patterns are produced by drawing a number of lines across the screen from point to point using the cursor keys and function keys. These can be horizontal, vertical and at various angles, the lines can be in a range of colours and areas of the grid can be coloured. When you have drawn all the lines required, up to four mirrors can be applied to the grid. These mirrors reflect the lines drawn and produce a more complex pattern.

Bounce is a great way to start a love affair with geometry. The program allows you to set up a bounce sequence using different frames. A square, circle, rectangle and equilateral triangle are offered and number of bounces to be made by the ball is chosen. It might sound like a straightforward piece of physics but it opens up a host of mathematical possibilities.

Tiling allows children to design two coloured tiles that can be laid on the screen. The tile design can start from either a triangle or a rectangle and there are two different sizes of these shapes that the user can start with. Before the tiles are laid they can be distorted by moving individual sides with a crosshair cursor. The newly created tile is then tessellated and laid out on the screen with alternative tiles coloured.

Tracks is a Spirograph-like program. It allows you to create an image resulting from the points of intersection of lines projected up and across from points moving harmonically along the horizontal and vertical axes. The program requires you to specify the starting x and y co-ordinates, the speed of the pen movement, the degree of damping and the amount of squash.

The Art Machine programs are all easy to use, but unfortunately style is not consistent. This is because, firstly, none of the programs have been designed to be Risc OS-compatible and secondly the presentation and means of operating the programs varies between the different programs provided in the two packs. The programs in Pack 1 have clearly been written with the Archimedes in mind. Large colourful and appropriate icons are used to control the programs and outline fonts are used for the text. These were designed by Topologika and programmed by Jonathan Lynch, David Wilkins and Mark Wilkinson. The programs in Pack 2 were developed by Central Software and programmed by GSN and, unfortunately, look more like conversions from the eight-bit BBC micro – which a number of them are. Function keys and the cursor keys are mostly used, although the programs can be set to accept mouse input as an alternative.

Perhaps the saddest thing about these exciting programs is that these wonderfully artistic screens, which just about anyone can create, are not stored in *Draw* format, which means they cannot easily be transferred to other A3000 graphics packages.

The software is accompanied by an outstanding and beautifully produced 64-page full-colour book called *The Art Machine Pattern Book*. It's one of those tumble books, with two front covers; one for each half. Although there are sections on each of the pattern types that the software covers, this is not a user manual, Help for the software is provided on individual four-page A5 leaflets. Instead, it can best be described as an action and activity book that will get you enjoying making patterns. There are also plenty of photographs of patterns – those made by peopleand nature as well as by computers.

With *The Art Machine*, Topologika manages to mix art, mathematics and computing. The results look stunning on the screen but even better when dumped to a colour printer. The ten programs are available as two packs: Pack 1 has Pattern Tiles, Snowflakes, Trees, Moving Squares and Cyclic Stories while pack 2 has Weaving, Pattern, Bounce, Tiling and Tracks. Each pack contains four discs and costs a very reasonable £29.95. The potential of the Archimedes and BBC A3000 is well acknowledged for high-quality graphics but this pack of software draws art, mathematics and computing together in a new an revealing way.

Incidentally, the original Art Machine exhibition is still floating around the country. It's not feasible to print a schedule here, but if you're interested in catching it, get in touch with Bryan Kerslake at Topologika.

PRODUCT DETAILS

- **Product:** The Art Machine
- **Supplier:** Topologika, PO Box 39, Stilton, Peterborough, PE7 3RL Tel: (0733) 244682
- **Machines:** Archimedes/BBC A3000
- **Price:** Two packs at £29.95 each
- **Comments:** An intriguing integration of art, maths and computing with stunning graphics. Aimed primarily at the educational user

Triple RRR Education

Triple RRR Education is a new company established to meet the ever-changing complex needs of YOUR child and the National Curriculum

Behind Triple RRR Education

Pete Davidson (Project Director)

Pete has a BSc((hons) in Mathematics and Computer Science and also has certificate of education. He has been involved in education all his working life and has taught in Primary and Secondary schools and also lectured at University.

Over the past few years he has been involved in publishing magazines and software. He has been features editor of **The Micro User** and the world's first educational computer comic **Let's Compute!** He's also worked on many top educational software packages such as **Mini Office, Mini Office II**, and the award-winning **Fun School** series.

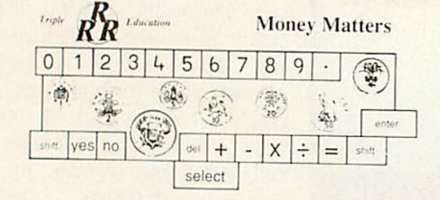
Steve Botterill (Financial Director)

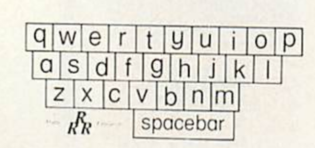
Steve is a well-known figure in the computer software industry. He helped to establish **Superior Software** as the leading games producer for the BBC and Electron from 1982 to 1988. More recently he set up **Impact Software** and now is co-director of **The Fourth Dimension** and ***Triple R Education.***

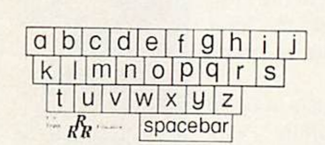
Steve intends to bring to educational software the quality of sound and graphics that modern games display but are lacking from other packages. And with all the Fourth Dimension equipment and programmers to help, *Triple R* is going to set brand new standards for educational software.



The REVOLUTIONARY Triple RRR Overlays







Children find the QWERTY arrangement and the capital letters of computer keyboards confusing. They're fine for typists, but far from ideal for use with educational software. So, to give YOUR computer a purpose-designed keyboard, ***Triple R Education*** has designed a UNIQUE series of overlays. They simply attach to your normal keyboard and can be quickly fitted and removed as necessary.

Your child need no longer be forced to use a keyboard designed for adult typists. He or she can now use one specially created with education in mind. They all have lowercase letters and are supplied in both alphabetic and qwerty order. There's even one showing coins to help children get to grips with money.

These keyboard overlays are essential to help children to learn more from their computer!



AMAZING MAIL ORDER OFFER!

Buy any two of these innovative educational products and choose another FREE.

When you order, just let us know which three educational packages you want. You'll only be charged for the two most expensive.

HURRY: *This offer ends on September 30th 1991*



Triple  Education

Picture Book

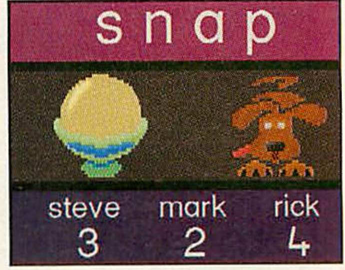
A fabulous friendly welcome to the computer world with a suite of four colourful programs. All use superb pictures and great sounds to keep children happy for hours as they learn:

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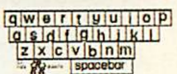
BBC





ARCHIMEDES

Picture Book comes complete with two revolutionary lower case keyboard overlays



Money Matters

A superb suite of programs to teach currency facts. Based on a circus theme it's ideal for all children from tots to teens. Youngsters will love the cheerful clown graphics and the unique coin keyboard overlay. **This is the best way for children to learn all about British coins and ways of tendering sums of money.**
For the more advanced child higher levels are designed with specific National Curriculum attainment targets in mind.

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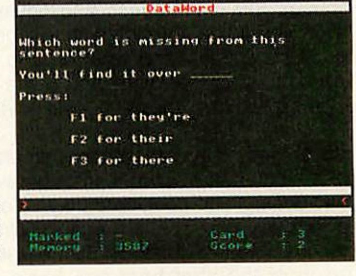
Money Matters comes complete with a keyboard overlay. Children can press pictures of coins rather than the computer keys

DataWord

This unique program has been designed with ease of use as a priority and fulfills many of the needs for a database in the National Curriculum. It works just like a card index but the flexibility of the text editor allows you to also use DataWord as a word processor too! Another really powerful feature of Dataword is the built-in card linking system which means parents and teachers can create files of inter-connected cards. **THIS IS NOT JUST A DATABASE**, it's a word processor, quiz game, electronic programmed learning book and a fabulous introduction to the world of Information Technology.

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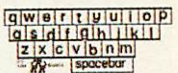
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Data Word comes complete with two of the revolutionary lower case keyboard overlays and FIVE fascinating example files.



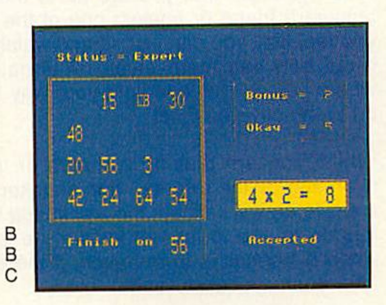
Target Maths

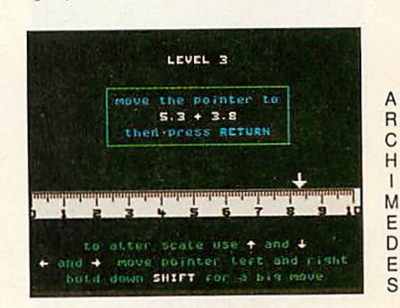
Four cleverly designed educational games that make children want to come back for more. Each has been thought out with specific National Curriculum targets in mind.

Eliminator: Learn tables and progress from Novice to Expert.
NumberFax: A unique game showing factors, odd and triangular numbers and more.
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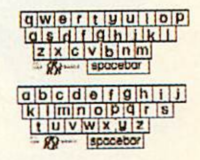
Target Maths comes complete with details of how each program meets the needs of the National Curriculum

Converta-Key

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Triple R alphabetic overlays are unique and our software is designed to work specifically with them. However we have now produced a program that lets you use the alphabetic overlay with any software that you write yourself. **It will also work with lots of currently available commercial software too!** Comes complete with a suite of introductory programs that you can use or customise to your own needs including: Hangman, Quizmaster, Anagrams, Memory Master, Find it and Speed-type.

Converta-Key comes complete with two of the revolutionary lower case keyboard overlays



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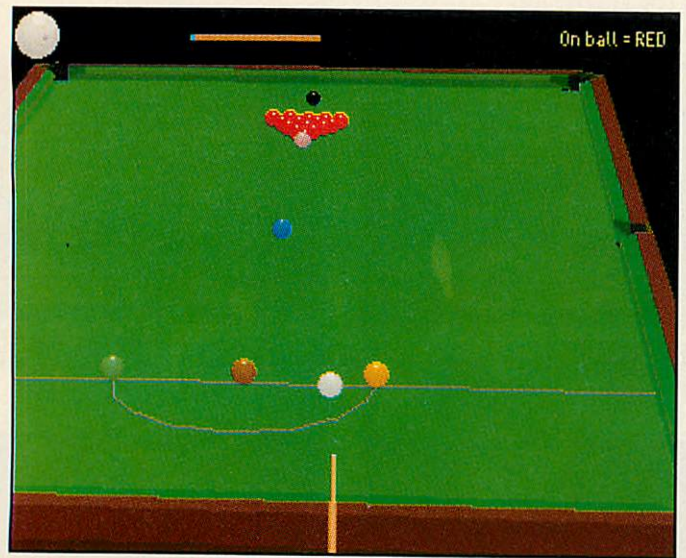
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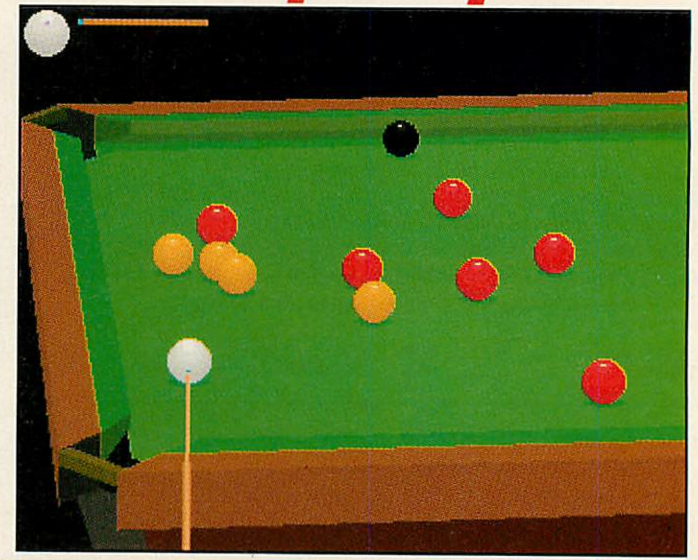
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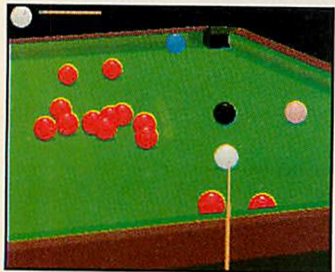
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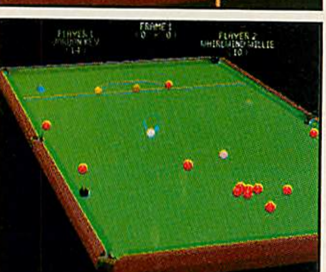
Break 147 & Superpool





"Snooker & Pool Simulator Par Excellence"

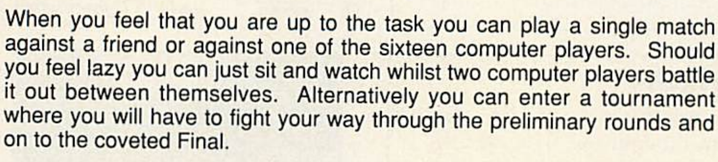




'BREAK 147' and 'SUPERPOOL' are game simulations in the true sense of the word. Gone are the power meters and fixed screw and side settings of inferior simulations and in comes a cue driven by reality software.

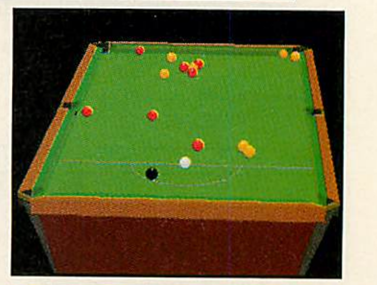
As in the real thing your grip on the butt of the cue (represented by the mouse), the smoothness and power of your cue action and the way in which you follow through with a shot, are all deciding factors in whether a pot is successful and whether you will retain position for the next ball. The only thing that is missing is the smokey air and a pint of beer on the edge of the table, these you will have to provide for yourself!

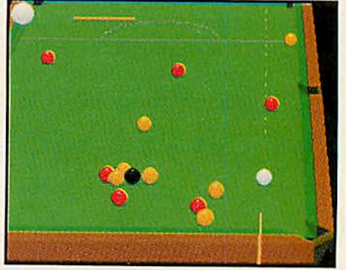
In both games you can choose to play on a practice table where anything goes. You can position balls wherever you wish so that you can improve your potting and positional play. You can even undo unsuccessful shots so that you can try them again. When you make that incredibly fine clip into a pocket or miss by the merest fraction, you can watch an action replay of the shot from any angle so that you can either gloat or see where you made that tiny mistake that let you down.



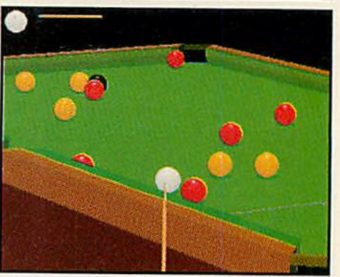
When you feel that you are up to the task you can play a single match against a friend or against one of the sixteen computer players. Should you feel lazy you can just sit and watch whilst two computer players battle it out between themselves. Alternatively you can enter a tournament where you will have to fight your way through the preliminary rounds and on to the coveted Final.

Whilst you are playing a match or in a tournament the game will be overseen by the referee. If in snooker you are 'on' a colour as in real life the referee will indicate the ball to you that he thinks you are going for and it is up to you to let him know if he is wrong. The referee will also call when a freeball is to be given, if there is a touching ball and your score after each successful shot.



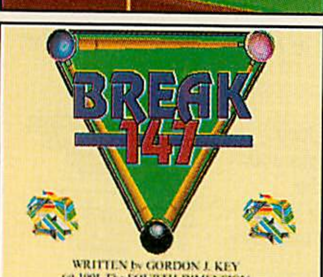


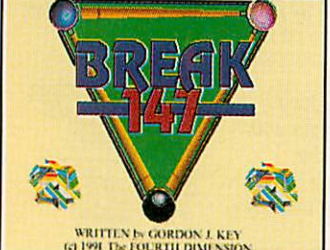




SPECIFICATIONS

256 colour MODE 13 graphics optimized for maximum speed
225k of machine code
Over 147k of high quality sampled speech and sound effects
Ball plotting accuracy of +-0.05 of an inch on a 12 foot table
Cue butt controlled by the Mouse
Bridge hand controlled by Keyboard





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SPACE CADETS

DAVE FUTCHER boldly goes into Zillion, the adventure that lets children learn about the solar system by saving the Earth

Our children are products of the space age. They are surrounded by space imagery and have a natural interest in planets, stars and space travel. It is no wonder that the Earth in space is an important aspect of science in the National Curriculum.

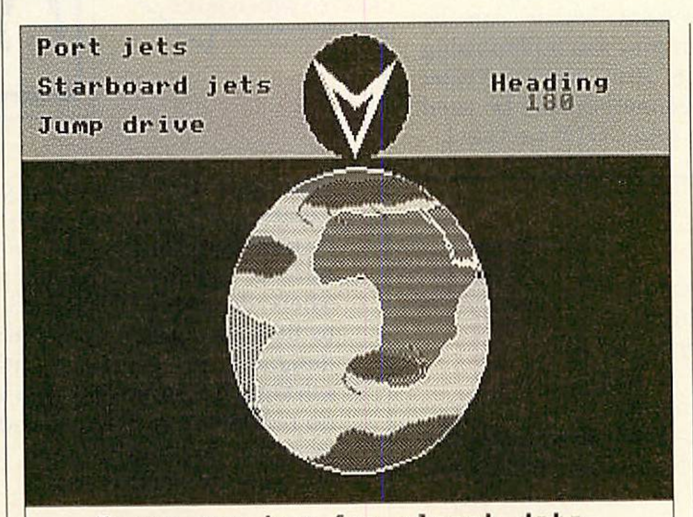
Zillion is a science-centred adventure, developed by Marshal Anderson and Sherston Software for the BBC micro and Master series of computers, that uses this interest and builds outwards from it, involving children in a whole host of scientific discovery across a wide range of science attainment targets.

The program is supplied on two discs, one a key disc that is used to start the program and the other a flippy with all the data for running the program on two sides. This latter is copyable.

The adventure starts with a group of children winning a trip to visit the Johnson Space Center in Houston in the USA, and while they are there strange things start to happen. As they are visiting the mission control room, an unidentified flying object is suddenly approaches Earth and a message is received from someone or something called Zillion who has come to destroy the world and the whole solar system.

The children survive the attack and find themselves in a strange landscape – all the buildings have disappeared but a new spacecraft has appeared. They enter the spaceship and find a message from Eric, the ship's computer, that tells them that the evil Zillion has moved all the planets in the solar system into incorrect orbits and made them so unstable that they will soon disintegrate if they are not sorted out. A way has to be found of putting them back in their right orbits, but to do this they have to face Zillion. To aid them in the task, the spaceship is equipped with many wonderful devices.

After take-off, the computer switches to the Solar Map display and the children find that they can move around the solar system in discrete jumps. The convention throughout the program is to access options by pressing their highlighted initial letter, so to enter a heading you type H and then the heading required. The pointer at the top of the map display moves round to that angle and the new heading is displayed on the screen.



ZILLION: CAN YOU SAVE THE WORLD?

On typing J for Jump Drive, the children are asked to enter a distance in millions of kilometres and this then shows a change in the position of the ship on the map. As the orbits close to the Sun are rather cluttered, the map display has a scale option which is accessed by pressing S.

When jumps get you close enough to a planet the spaceship's computer lets you orbit it. This gives you a chance to have a good view – a picture of the planet comes up on screen with a collection of physical data about it. The aim of this part of the program is to identify the planet – *Zillion* also includes nine planet cards which have the same information on them together with the planet's name.

Exploration also reveals that in addition to the usual planets in the Solar System there are three new planets. These are Curli, Lari and Mo from the Stoogeez system near Betelgeuse. If you have a star map you will find Betelgeuse in Orion. These planets have a crucial role in *Zillion*, as they have to be landed on so that the whereabouts of Zillion can be discovered.

Zillion is no ordinary adventure game; instead it features 'real' scientific investigation and problem solving. The major activity concerns some seeds that need planting – the children's task is to work out where they should be planted. In the spaceship's biolab three of the variables that control the growth of the plants are investigated and, once the conditions to achieve 100 percent growth are worked out, they have to be planted at special sites on Curli, Lari and Mo.

Each of the planets also have an additional 'special' problem. On Curli it is an ecological problem caused by the use of insecticides. On Lari the problem is to get the pumps going to run an irrigation system. On the planet Mo, the Snibs are ill and the only cure is in the black ice of the North Pole.

Once the tasks on Curli, Lari and Mo have been completed, the children can land on Zillion's space station and when they do they are faced with three locks, which can be deactivated with some help from items collected on the planets. Zillion, which turns out to be a computer, then has to be turned off and here some mathematics is needed to solve the code which is based on the square numbers from one to 100 in binary. Once Zillion is turned off, the Solar Map reappears and the task of putting the planets into their correct orbits is undertaken – of course there is a Planetary Tractor Beam (PTB) to help.

Zillion is quite outstanding. Children between nine and 13 will be enthralled with it. It's imaginative but relevant and above all investigative. Marshall Anderson has managed to write a real scientific adventure that fits in well with the National Curriculum.

PRODUCT DETAILS

- **Product:** Zillion
- **Description:** Educational adventure game
- **Supplier:** Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire, SN16 0LH. Tel: (0666) 840433
- **Machines:** BBC micro and Master series
- **Price:** £26.45

Poster

An object-based DTP package which allows you to do far more than create posters. In fact there isn't much in the way of DTP design and layout that can't be done with Poster. It's almost an art package. The application is fully RISC OS compliant so can 'talk' to Edit, Draw and any other RISC OS program. Poster comes with its own set of unusual outline fonts but will allow you to use any RISC OS outline fonts. It also has a huge collection of interesting borders and clip art. Two features place Poster in a different league from other packages. Firstly, you can do wonderful things with text. It can be made to flow along any path or it can be moulded into virtually any shape (as can outline Draw files). Secondly, the size of your document is not dependent upon the limitations of your printer. Poster will allow a document of any size to be created (although 100 metres square is not very practical). It then prints the document in sections which can be cut and assembled using the trim marks. Poster documents may be used in other DTP packages.

A&B COMPUTING 1990 ART/DESIGN AWARD WINNER

Snippet

A utility which will make you wonder how you ever managed without it. Snippet will allow you to print or save any part of any screen. It will even cope with most programs running under the 65Host BBC Emulator. But Snippet will allow you to do lots more. Sprites may be converted from one mode to another and even 8 bit BBC screens may be easily converted into Archimedes sprites. A vast array of tools allows you to trim sprites, add borders, change colours, use outline fonts to add text, edit pixels, rotate sections and combine any number of sprites to make a single sprite. A carousel allows sprites to be displayed.

ALSO...

JIGSAW — allows sprites of any size to be converted into jigsaws with real jisaw-shaped pieces. It comes complete with a set of pictures including some by the well-known artist Rodney Matthews.

JIGLET — the version for younger users. It has fewer pieces and a more appropriate set of pictures.

CRAFTSHOP 1 and CRAFTSHOP 2 — programs allowing those with limited artistic ability to create some stunning results. Both packages are currently in use in thousands of schools and homes.

THIS BOOK WAS CREATED WITH POSTER

DTP SEEDS

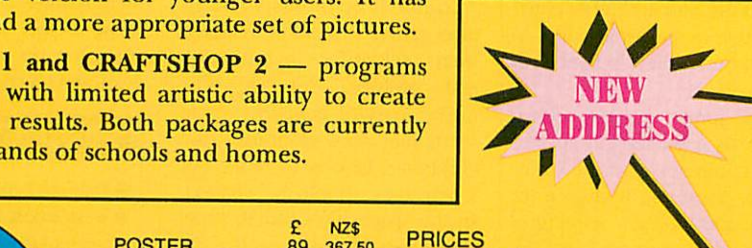
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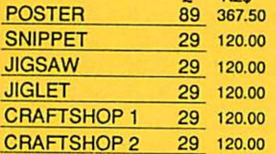


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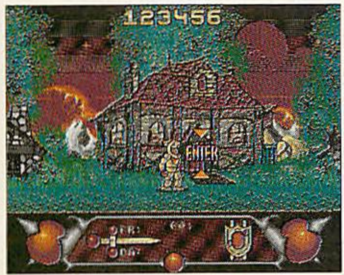
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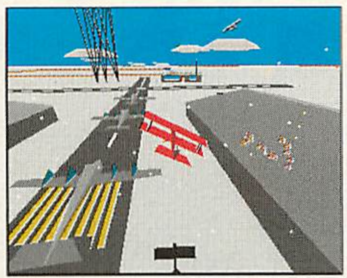


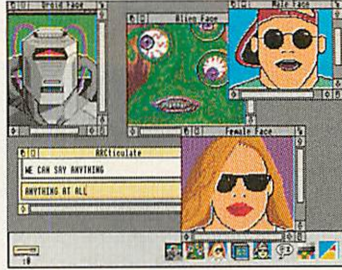

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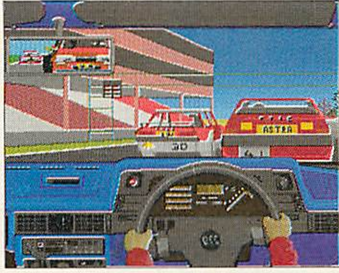
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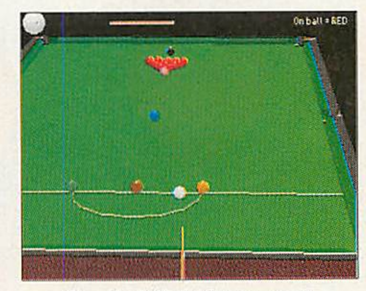

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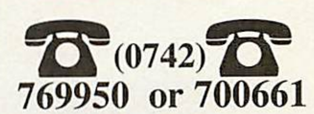
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Target Maths *(Educational Software)*	12.95	14.95	15.95
Converta-Key *(Educational Software)*	12.95	14.95	15.95
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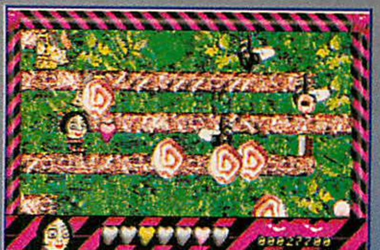
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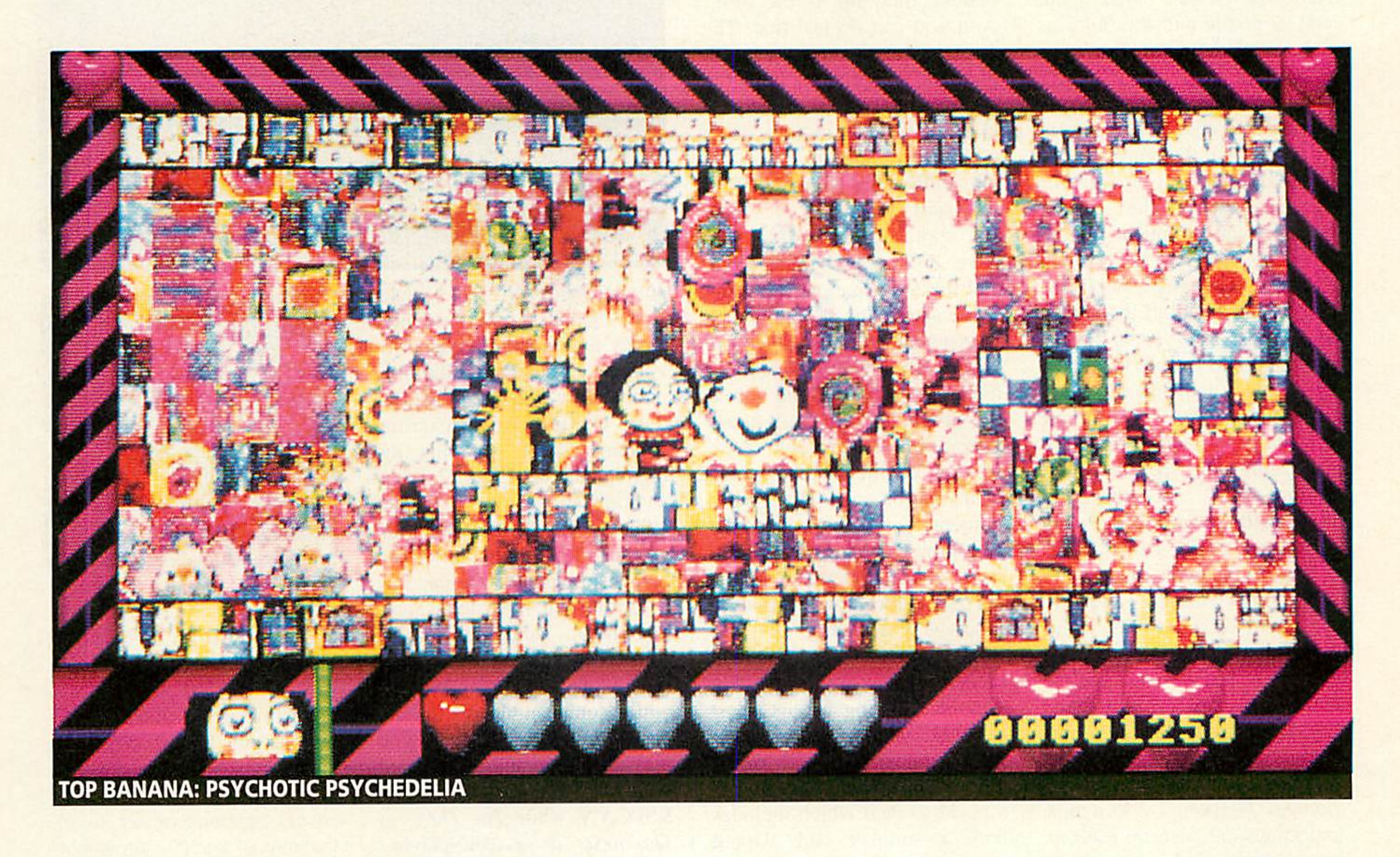


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STATE OF PLAY

With the BAU show due in a month's time, **SAM GREENHILL** looks ahead to some of the delights in store for games fans



TOP BANANA: PSYCHOTIC PSYCHEDELIA

Next month it's the *BBC Acorn User* Show, that annual gathering of readers, non-readers (all two of them), computers, publishers and their wares, this time at Wembley. This year will probably be one of the most exciting on record, assuming you're one of those people who gets excited. Why exciting? Simply because there will be better and more numerous games on offer for the Archimedes/A3000 than ever before. So what exactly is going to be shown, and – in the run up to the show – what state are the games in now?

If I were asked to name the game that's tipped to dominate the show, and in my opinion the Christmas market, then the obvious answer would be *Lemmings*. *Lemmings* is a game that has been out on the 16-bit machines for exactly one year now, and has achieved cult status. I recently saw the Archimedes version being written and prepared for a show release by Krisalis Software, and it looks every bit as good as the Amiga original.

Lemmings are small furry rodents that for some strange reason tend to topple off cliff tops and drown. Not only that, but when one's gone over the edge the trend is set. Its companions follow suit, and if left to their own devices the whole giddy lot plummet down, not realising until they reach the bottom that the decision to play follow-the-leader was probably unwise.

This is, broadly speaking, what would happen in the game of *Lemmings* if you were to do nothing but watch. Of course watching the daft sods is the easy part. Saving them is the tricky bit, and to help you in this task you can make the odd lemming build a bridge, dig a hole or even self-combust if necessary. The hundred or so lemmings on the screen are oblivious to the dangers of cliffs and many other hazards, and, using techniques such as bridge-building the object is to get as many of the suicidal little blighters into the safe house as possible.

If you've never seen *Lemmings* then you can imagine, and those who have seen it agree, that the game is an original. It's bound to steal the show. You can see it on the Krisalis stand.

Although this rodent game will be Krisalis' main offering, it does not brave the Acorn world alone. *Chuck Rock* is a game in which you control a caveman. And like most cavemen, our man Chuck is surrounded by stupid, but hostile, dinosaurs – and some rocks. Put the two together – literally – and you have *Chuck Rock*, a simple arcade game with platforms and 'collectables' (lumps of meat).

The nice thing about this game, and the near-complete 32-bit version I've seen is a graphically perfect conversion from the Amiga, is that the characters, Chuck included, are really big. They are also animated extremely well, so the game looks much like a real cartoon, with dinosaurs moping about, Chuck looking mean (and pretty thick with it) and great boulders plus small rocks falling on unfortunate beings. But at least among Chuck's few defences is his rather large belly.

Last but not least on the Krisalis stand will be *Manchester United Europe*, the sequel to *Man Utd FC*. The

new version does not looking amazingly different, though there are a few changes. To begin with, the management aspect of the original has been simplified a bit, and control over all the aspects of purchasing players has been improved.

The two-player mode can now be adjusted so that both can play on the same team, one as goalie and the other as the rest of the team. But apart from that and some minor graphical enhancements, this particular program didn't seem to be too wildly innovative. I guess I'll just have to wait for the show and the review before I can comment on the game any further.

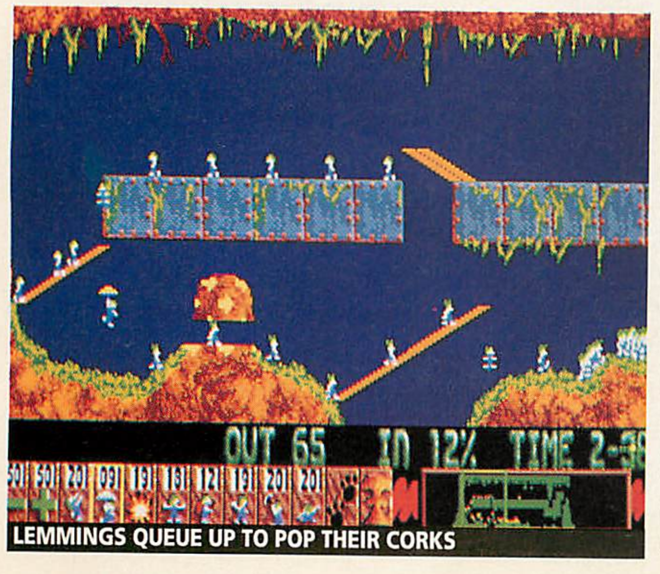
Arxe Systems is a publisher that has attended all the shows in the past few years, mainly selling other people's games. This time it will have its own trumpet to blow, or two in fact – actually, it would be really interesting to see someone attempt that – since the *BAU* show will serve as the platform for a double launch.

The first game is to be christened *Boing*, and is similar to the arcade game *Pang*, in which you burst bubbles at a basic level, collect bonuses at another, and monkey around on platforms and ladders with flame throwers on a third – at least you do in *Boing*. Harpoons, shotguns and mines can also be used to burst the bubbles on later levels. With the use of such devices I guess we're not taking any prisoners!

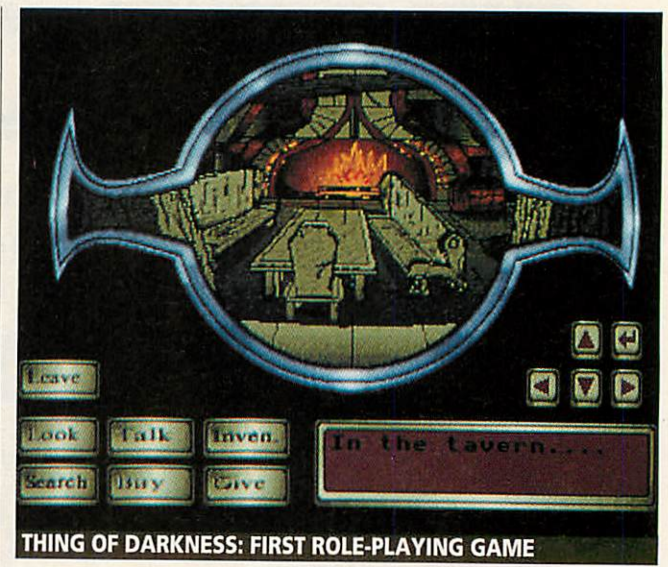
Game two from Arxe is as yet nameless, except to say that it is a game somewhat similar to that arcade classic *R-Type*. Well, we've had some of those before, so what's new? Onkar Jagpal of Arxe said: 'We've been concentrating too much on getting the game right to think of a name. Basically, you have to see the graphics and experience the game play before you'll believe that this is the best.' And you can do just that. The *R-Type* clone comes with parallax scrolling in both the horizontal and the vertical planes, so all motion feels completely natural. 'It's the playability that people will go for', said Onkar.

I spot a clash. Arxe will have *Boing* the bubble game and the *R-Type* clone on show at the same time as The Fourth Dimension releases *Enter the Realm*, its sequel to *Nevryon* – itself an *R-Type* clone – and the French software house Eterna releases *Bubble Fair*, another bubble busting game. Both Eterna and The Fourth Dimension will have stands at the show. Perhaps a couple of comparative reviews are on the horizon if these two games are in any way similar.

The Fourth Dimension will launch nothing at the show but will be showing off its latest releases which will include *Enter the Realm* and *Break 147 & Superpool*. The latter is a package deal which includes both a snooker and a pool game for the price of one, but then think for a moment – what exactly does this mean? Well, paint a few balls, change a couple of rules and hey presto! So really, we're taking about a green-table-with-coloured-balls-on-it game. Both games have practice tables and action replays for viewing those exhilarating moments when the ball just drops in – just like the exciting evenings spent watching the highlights on BBC 2. The authors still haven't implemented the all-important 20p on the side of the table feature yet, despite popular demand...



LEMMINGS QUEUE UP TO POP THEIR CORKS



THING OF DARKNESS: FIRST ROLE-PLAYING GAME

Eterna will have ten games on show, including *Bubble Fair* as mentioned above, and several new games, one of which sounds a bit like the old classic *Pengo*. In *Poizone* you play a penguin and mess about with toxic blocks (cue for the RSPCA?), while *The Thing of Darkness* is a role-playing game – the first, unless I'm very much mistaken, for the Archimedes/A3000.

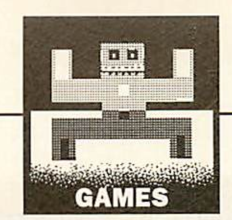
A new games publisher called Hex has appeared on the scene, and brought with it a new game called *Top Banana*, a game that is, like, psychedelic. The graphics are sort of hip hoppy, all digitised from videos and the TV, and the sound is produced by the DJ samplers Coldcut. I reckon the sound is the best I've ever heard in any game, as an opener. It's really psycho, eerie. The game? Nearly forgot: ladders and platforms! Collect fruit pastels by the looks of it, and 'jump to the beat', noting that some with objects you 'can't touch this'. Although Hex does not have a stand at the show you can see *Top Banana* on the Syracuse stand. I just hope they have a hi-fi system set up.

Krisalis Software has several other projects on the go, though the three mentioned earlier are the only ones likely to be at the show. *James Pond, Licence to Gill*, will soon be reporting in to show us his bubble gun before swimming away – because he's a fish, you see – to save the undercover, or under-water, world from ecological catastrophes such as oil spills or dumps of radioactive waste. Oh, and to save any mermaids that get in trouble, in true 007 fashion. Well, nearly.


PACKAGE DEAL POOL

I've seen an early version of *James Pond* running on an A3000 and it looks as though it will turn out identical to the Amiga version, which again was a very popular title. Pond himself is a cute little guy that whizzes about along the sea bed past wrecked ships collecting life-giving rings and popping up to the surface occasionally while holding his breath. The graphics are pretty colourful and the game play is standard arcade action stuff. *James Pond* should be out in November. Watch this space for a review soon.

Remember – next month will be show month, so don't forget to check out Game Show to find out just which games will be at Wembley.



GAME SHOW

ZELANITES

Micropower. Tel: (0532) 458800 Archimedes/A3000 £24.95

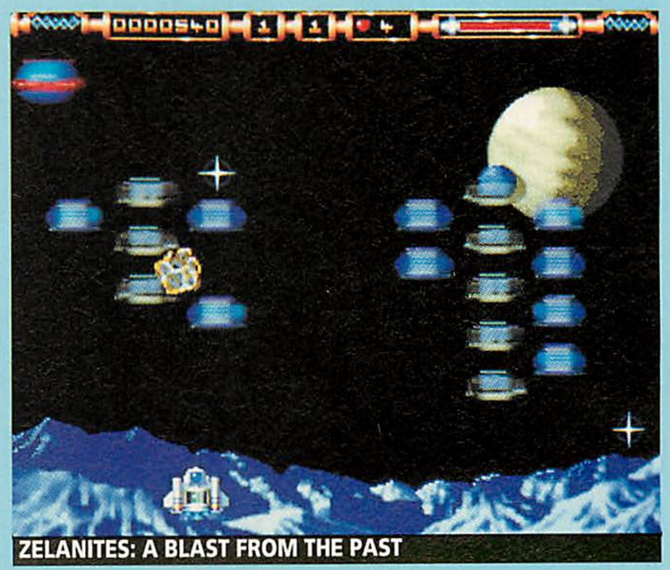
Um, *Space Invaders*, basically. That's the first thing that springs to mind when you play *Zelanites*. I'll bet there are some people reading this who don't know what *Space Invaders* is. Well, when I were a lad, the local fish and chip shop had a video machine in the corner which had painted on the side a dark furry alien advancing menacingly against a purple background.

You controlled a little spaceship at the base of the screen, which moved left, moved right or fired: three controls. And then there were the invading aliens, moving left and right and progressively down the screen, slowly at first but faster as less survived your gun fire. They dropped bombs, you avoided them and after they'd been wiped out, another wave began its descent.

And that was essentially that. Simple but effective. *Zelanites* has the same feel to it. You only need to worry about moving and shooting – the classic symptom of the classic shoot-em-up. I like what Micropower has done here, because it's taken *the* classic video game and turned it into a quality computer game. I say this because the basic idea of *Space Invaders* has not changed: only the features have been enhanced. The 256-colour graphics are fine and sparkling, the movement is nice and smooth, and the sound is, well, adequate,

Mind you, I could do with a password feature. Starting each new game from the very first screen each time may demonstrate the game's faith in its origins but it can get a bit boring having to play the first nine or so screens just to get back to where you left off.

In play, bonuses parachute in from the sky and give you rapid-fire, a shield, a laser beam, missiles and several other goodies if you manage to collect them, but these are only temporary so you still have to keep your wits about you.


ZELANITES: A BLAST FROM THE PAST

The main thing is that this is addictive. I definitely felt the urge to have 'one more go'. Micropower has resisted the commonplace temptation to hype an old classic beyond recognition, and this actually makes it quite relaxing to play. But *Zelanites* will never escape being dubbed *Space Invaders* and this is a serious point. Zapping aliens is all you get – *Zelanites* is certainly no mega-game – but if you've understood that and you still want to know how good this is as a simple *Space Invaders* shoot-em-up game, then the answer is: good.

Sam Greenhill

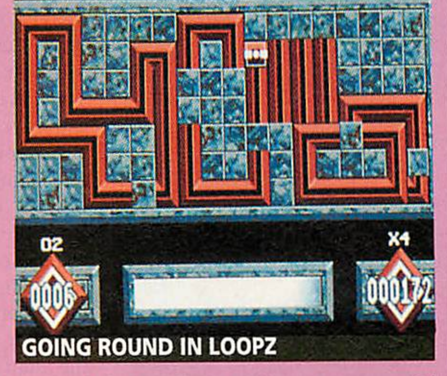
LOOPZ

Audiogenic. Tel: 081-861 1166. BBC disc £15.99 Archimedes/A3000 £24.99

Imagine a cross between *Tetris* and *Pipeline* – if you know both those games, then you have the flavour of *Loopz*. You are presented with a squared board, and a series of pieces to fit together into complete loops – corners, straight sections and devious dog-legs. Each section you fit onto the board within a time limit wins a few points, and complete loops disappear to allow you more room. Incomplete sections gradually fill the board until you can't fit any more.

Loopz is easy to get into as, at the lower levels, you get lots of easy pieces at first. Take this opportunity to build a loop full of baroque twists and turns to score extra bonus points. But the easy pieces soon dry up and you're left with six loops all awaiting that elusive corner section. The higher levels give you less and less time to find each piece a home.

A variant of the basic game puts a complex loop on the screen, and you have to 'subtract' each of the pieces from it as they appear.


GOING ROUND IN LOOPZ

Loopz has the intrigue and instant playability of *Tetris*, but is quite without the originality. There are both Beeb and Arc versions, with little difference in the game play. The usual keys move the piece around the board, and you can rotate it before dropping it into position with RETURN. Of course the Arc version has the option of mouse control – it helps – better sound and graphics, with 'marbled' backgrounds and nicely shaded pieces of loop. Some of the later games are positively garish – rainbow hues and silvery tracery that's rather hard on the eyes. It runs from and returns to the desktop (using CTRL-ESC).

But then the Beeb version has music by *BAU* columnist Ian Waugh and perfectly adequate four-colour graphics. It's marred only by an annoying screen flicker every few seconds, and the fact that you need a 40-track or switchable disc drive.

On the Beeb, this is certainly a contender for the cash of novelty-starved eight-bit beep victims. The Arc version, on the other hand, is a little on the expensive side.

Graham Bell

SALOON CARS

The Fourth Dimension. Tel: (0742) 700661. Archimedes and A3000 £24.95

To be quite frank, after The Fourth Dimension's last attempt at a race-car simulator, *Powerband*, I was very sceptical about *Saloon Cars*. It turns out I had nothing to worry about. *Saloon Cars* excels where *Powerband* failed.

Although the main part of the game is the driving of the car, there is a long term goal here, and that is to work your way up the amateur ranks, racing at weekends and during your spare time.

Technically, this game comes close to rivalling *Revs*' realism. It's uncanny the way that you can tell which car you are in, (even without looking at the badge on the steering wheel!). The attention to detail and the quality of the graphics are first class. All this without even starting the engine up. Once the engine is idling the screen will begin to oscillate up and down, but if you rev the engine a little it smoothes out, just like a real car.

Once on the move I expected this game to lose some of its appeal. It didn't. It was in actual fact very impressive. It is a very reasonable simulation, giving total control over the car's behaviour to the driver. The down side to this is that because it is a good simulator, it is slightly difficult to play. At first it seems that you spend all your time ricocheting from barrier to barrier. Do not give up – in a short while you will find yourself lapping at quite a pace!

There aren't really that many tips I can give on how to lap quickly. All I will say is that it took me a lot of practice in solo mode to even get anywhere near a decent qualifying time. If pushed I would say that anything under three minutes a lap on the new Silverstone circuit will put you on the back rows of the starting grid in a respectable position.

Actually this game is much like *Elite*, but with racing cars instead of spaceships. You can part exchange main components from your car, such as the engine, anti-slip clutch and so on, and once you have accumulated enough prize money you can even buy yourself a new car. You can progress up the ranks from Astra to M3 to Cosworth. Each one is a new challenge, since each one is different to drive.

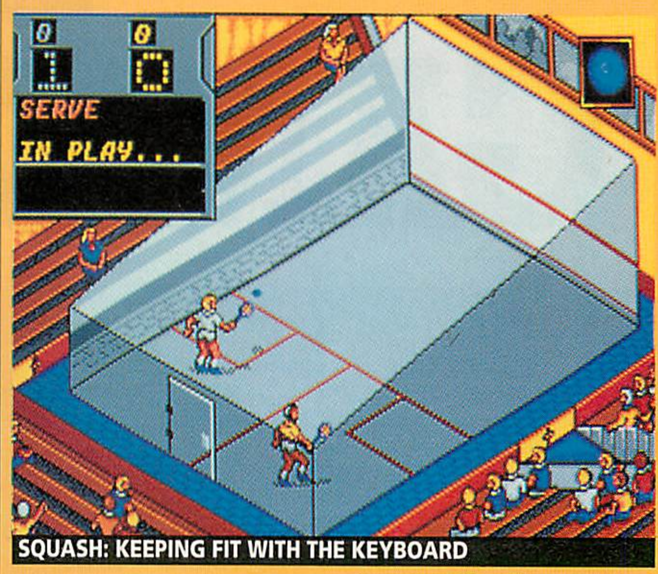
You keep control of your own budget and the money aspect combined with the long-term planning features of the game make you think twice before splashing out on expensive extras. Fitting the car out correctly becomes realistically more important.

Hence, this game has the potential to provide long lasting fun. And there are not many games you can say that about. For all you driving and/or racing enthusiasts this is the one you've been waiting for. It's also fine for anyone who just wants a good game.

Andreas Englezou



SALOON CARS GETS YOU ON TRACK



SQUASH: KEEPING FIT WITH THE KEYBOARD

JAHANGIR KAHN'S CHAMPIONSHIP SQUASH

Krysalis Software Tel: (0709) 372290. Archimedes/A3000 £25.99

New from the Krysalis stable comes this, the latest in a series of slick sports simulations, this time dealing with, you guessed it... Squash! Having won the world championships no less than six times, Jahangir Kahn has finally been immortalised in his very own computer game.

The game's graphics appear to have been directly ported from the Amiga or ST version as, I suspect, were the sound samples, but this detracts very little from the atmosphere and gameplay, since a lot of effort went into their original design. The only place where a little more care would have gone a long way is in the digitised shots of J.K. himself, which suffer slightly from direct transference to the Arc.

As in previous simulations, you have the last word on all aspects of an entire championship should you wish, as well as playing the sport itself. Taking the role of Jahingir, you have the choice of competing at club or world level, simply practising or watching any of the other players' matches. In addition you are able to view the statistical quality of any opponent and alter factors such as ball-bounce, service rules, or scoring thresholds through use of the endearing moving icons that Krysalis are so fond of. All this gives you tremendous control over the games you actually play.

You view the court isometrically, from a diagonal perspective above the playing area, and the glass sides allow you to see inside with ease. Computer squash takes some getting used to, but is extremely enjoyable once you've become proficient. Just as in real squash, agility and fleet-footedness is the name of the game; you have to get to the right place on court without hanging around. To do this, you will need an instinctive feel for where the ball is going to land, and this comes with practice. (The last sentence was first used by David Coleman circa 1965 - **Ed**).

Once you have this knack, you can start to add bias to your strokes by playing drop or power shots with spin to either side to confuse your opponent, who can be a friend or the computer. There is an easy option for those who need it which is useful for practising, where the computer will play your shots for you, and all you have to do is get to the right place at the right time.

Along with two excellent tunes of the irritatingly catchy variety, you could buy a lot worse than this at the moment. I am told that we can expect many other illustrious titles from Krysalis in the future, so get out there on the court and show them that you support the Archimedes too.

Mathew Tizard

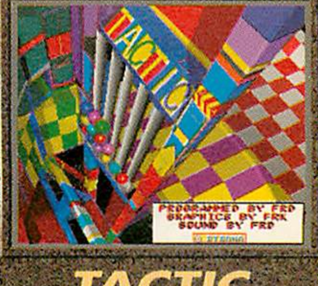




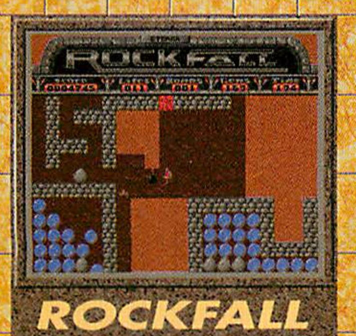
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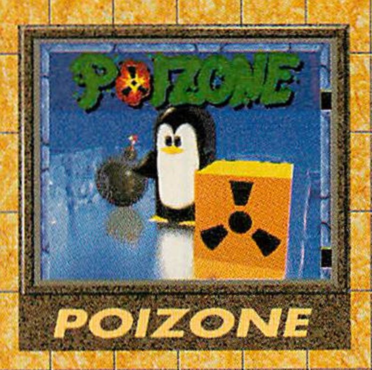
FINE RACER



BUBBLE FAIR



BLASTON



POIZONE



THE THING OF DARKNESS

BALLARENA : "...Game of top quality...",BBC/Acorn User; "...polished and professionnal as well as beautifully...",The micro user;"...technischer Perfektion bei der programmierung!..." ASM march 91

TACTIC : "...addictive game,containing precisely the right amount of simplicity and ingenuity to keep a player going back again & again "The Micro User;"...horribly addictive..." BAU,"...Technisch ist es ebenfalls nahezu perfekt...",ASM mai 91

BLASTON : 4 levels of fight with 256 colors,scroll,animation. "Blaston is well programmed,with good graphics and sound making a profiessional-looking package",The micro user July 1991

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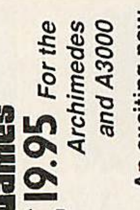
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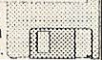
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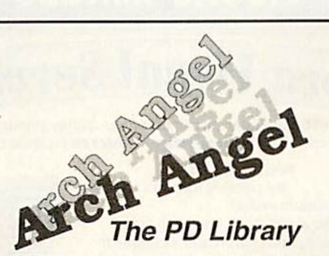
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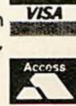
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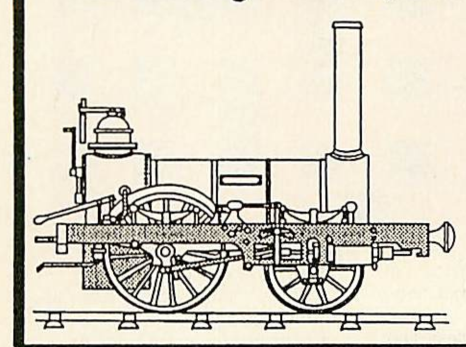


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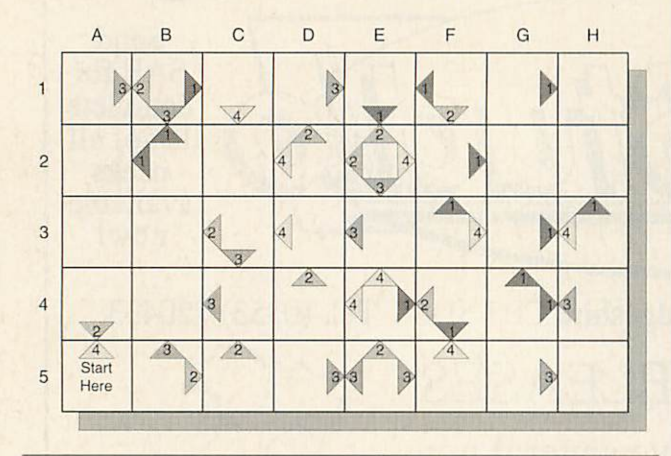
We will have several new products available and some special offers at the BBC ACORN USER SHOW



ACORN USER ADVERTISMENT PAGES - OCTOBER 1991

Step Wise

Pete the Purple Pirate discovered a rather peculiar treasure map (shown below). On the back it said that the doubloons could be found by taking 19 'moves' from the start point. A move involves taking the number of paces shown in an arrow in that direction. Where did Pete start digging and how many paces did he take?



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```
MO.4:
V.29,640;0;18,4;:
MOVE-640,408:
DR.640,408:
d=1:
s=8:
REP.
h=(h+1)A.7:
F.i=1TOs*8:
N.:
x=x+d*40*(INKEY-67-
   INKEY-98):
F.k=-1TO1S.2:
MOVEx+k*800,0:
DR.k*16,400:
N.:
d=1-d:
SO.16,10*(h>3),2+h
MOD2*3,1:
s=s+(INKEY-73 A.s>0)-
(INKEY-105 A.s<14):
U.ABSx>784
```

Note that this single line has been split at colons to aid legibility.

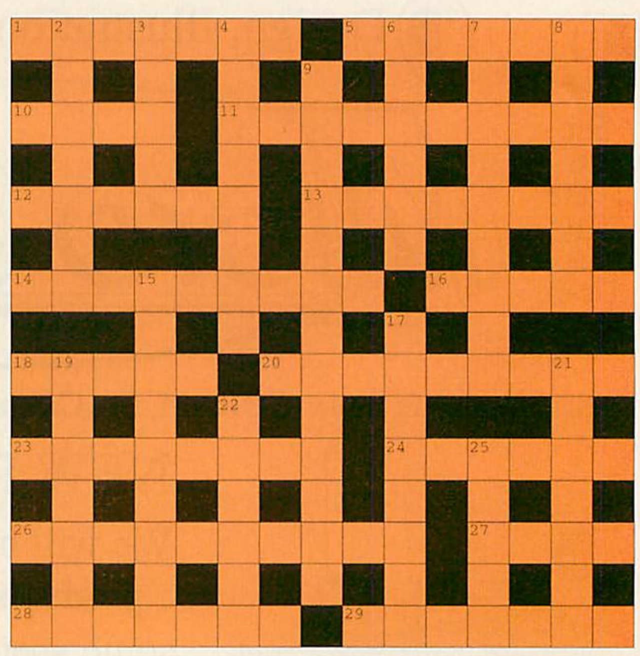
Solution to September's anagrams

● Giant mob punch dad	Dabhand Computing
● A wet roof surprise	Superior Software
● Top rate relish	The Serial Port
● Hot cacti men	Technomatic
● Acorn field-test crow	Watford Electronics
● Cement cup rots cop	Computer Concepts
● Nastier waveform	Minerva Software
● Hedonist uniform	Fourth Dimension
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Hex-chain-ge

£10 goes to **Nick Craig-Wood** (author of last month's juggling cover feature!) for this little mathematical diversion: Take the 16 hexadecimal digits (0-9, A-F) and arrange them into four 4-digit hex numbers such that their total (modulo 65536) is minimised. What is this total?

BBC Acorn User cryptic crossword, October 1991 set by Valerian



Across

1 Lose key in outskirts of Canterbury (not far from here) (5,2)
5 Secretly starts an endless task he'd hidden away (7)
10 Sailor returns after copper found on island (4)
11 Bad pun about old (and diminutive) guy making base machine (10)
12 Had a look with ? (6)
13 Views an example of spongy article (8)
14 Even teeth can be found in ravioli - so don't alert the chef! (9)
16 Guarantees that current velocity will lead to cries of pain (5)
18 Key movement (5)
20 See 20 (9)
23 Make slab seem tidy (8)
24 Why won't the French be returning in days? (6)
26 O? (4,6)
27 Medium red and sticky (4)
28 Non-oriental kites let free may knock one over (7)
29 Race around, gain a hundred and divide by 3 (7)

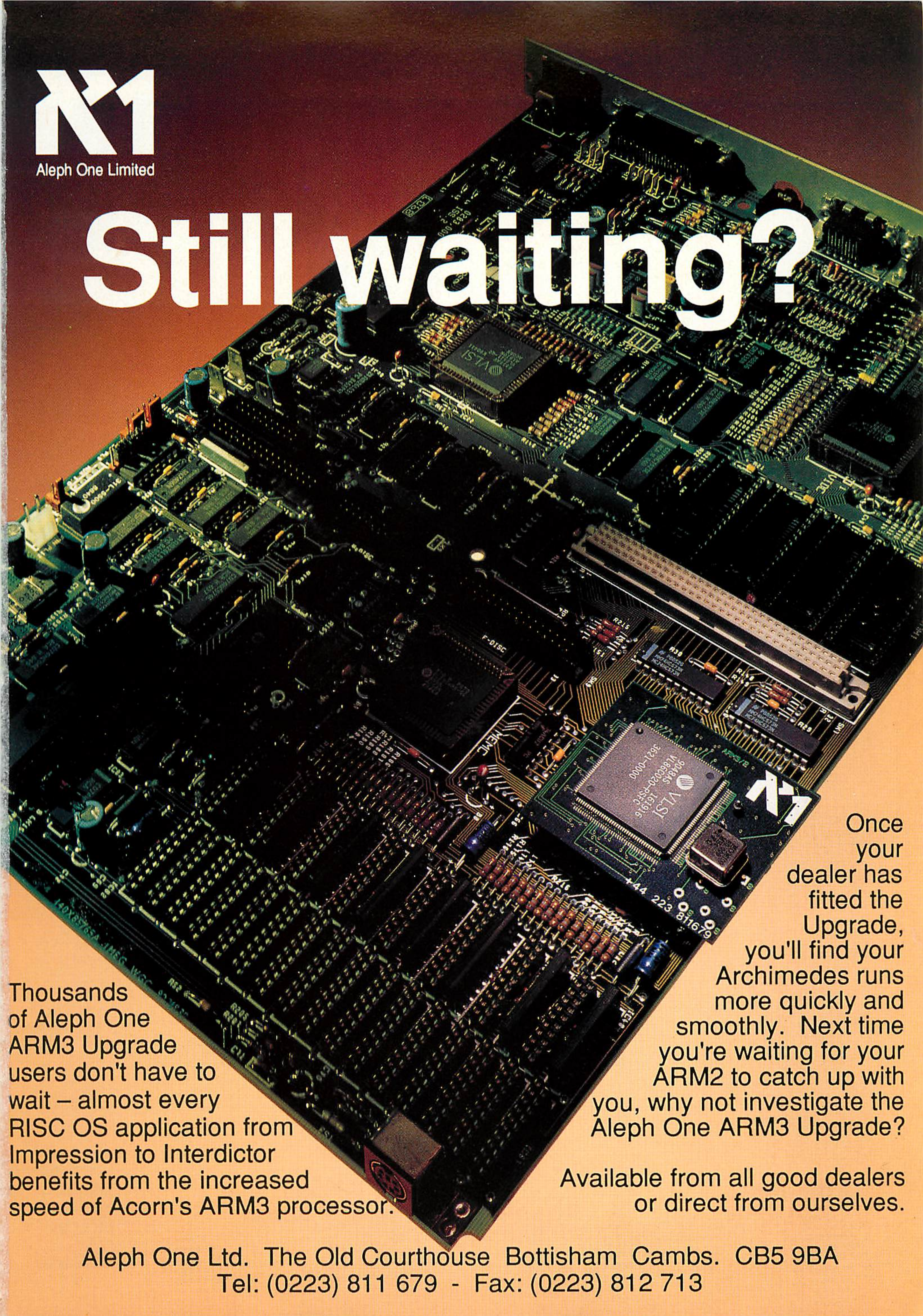
Down

2 Stan's resting place? (7)
3 Some black cats run up chimneys (5)
4 Leaping around the edge (8)
6 To represent heartless family first needs some form of pity (6)
7 Oscillations break wine vases (4,5)
8 Initially everyone yelled encouragement, but really - our wages could be raised! (7)
9 Comments made by thousands about New Testament after bible study? (3,10)
15 Disagree with ten rewrites of novel (9)
17 Drum up King and Queen to find killer (8)
19 Cushion with footwear? (7)
21 Diplomacy breaks down and US solicitor leaves games (7)
22 Slide down rope to new disabled centre (6)
25 Instruments with no mouth pieces can still be played! (5)

Chambers 20th century Dictionary is recommended. Send your entries to *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ to reach us by Monday 4 November 1991. Photocopies of your solution are acceptable. The solution (and winner) will be published in the January issue. The answers to Step Wise and Hex-chain-ge will appear next month. The winner of August's crossword (answer shown right) is Michael Pargeter of Hitchin, Herts.

Answer to August 1991 Prize Puzzle





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